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230987

October 18, 2002

VIA FIRST CLASS MAIL

Mr. Bernard Schorle (HSRL-6)
Waste Management Division
U. S. EPA Region V
77 West Jackson Blvd.
Chicago, IL 60604

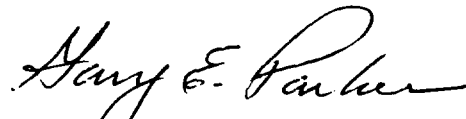
**Subject: *Report of Water Quality Conditions, Second Quarter 2002
Marion (Bragg) Landfill, Marion, Indiana***

Dear Mr. Schorle:

On behalf of the Marion (Bragg) Group, please find enclosed three (3) copies of the Report of Water Quality Conditions for the second quarter of 2002, prepared by O&M, Inc., for the subject site.

Please contact me at (630) 443-1940 with any questions on the enclosed reports.

Sincerely,
de maximis, inc.


Gary E. Parker

Enclosures

cc: Resa Ramsey, IDEM (cover plus one copy)
 John Hanson, Esq., Beveridge & Diamond, P.C. (cover plus one copy)
 Rick Meyers, United Technologies (cover plus one copy)
 Dan Garrigan, O&M Inc. (cover via facsimile only)

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REPORT OF
WATER QUALITY CONDITIONS
SECOND QUARTER 2002
MARION (BRAGG) LANDFILL
MARION, INDIANA

Prepared on Behalf of:
MARION (BRAGG) LANDFILL GROUP

Prepared by:
O & M, Inc.
303 N. Indiana St.
Danville, IN 46122

October 2002

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1.0 INTRODUCTION

This report presents water level data, field water quality measurements, and results of laboratory analyses for water samples collected at the Marion (Bragg) Landfill site during the quarterly monitoring event conducted in June 2002.

The sampling program consisted of sampling the on-site monitoring wells for the project specific indicator parameters: total suspended solids (TSS), ammonia-nitrogen ($\text{NH}_3\text{-N}$), chemical oxygen demand (COD), and chlorides (Cl^-). The monitoring program was designed to document the effectiveness of the landfill cap and is described in detail in the Remedial Action Plan (RAP) (Environmental Resources Management (ERM), 1989, Remedial Action Plan, Marion (Bragg) Landfill Site, Marion, Indiana) and Remedial Design/Remedial Action (RD/RA) Work Plan (Environmental Resources Management, 1989, Remedial Design/Remedial Action Work Plan, Marion (Bragg) Landfill Site, Marion, Indiana). Sampling locations MB-3 and MB-4 have been removed from the water quality-monitoring program as part of a condensed monitoring program following a no-further-action Record of Decision.

Water quality sampling at the Marion (Bragg) Landfill for the referenced period was performed June 13, 2002. All sampling and analysis were conducted in accordance with the requirements specified in the RD/RA Work Plan (ERM, 1989) and Quality Assurance Project Plan (ERM, 1990, Quality Assurance Project Plan, Remedial Design/Remedial Action, Monitoring and Additional Studies at the Marion (Bragg) Landfill Site, Marion, Indiana). Copies of the chain-of-custody forms are included in Appendix A and the data validation report is included in Appendix B. Detailed review of analytical data is presented in the data validation reports.

2.0 SITE CONDITIONS

Sampling event data is presented in attached Tables 1 through 9 and Figures 1 through 7. Review of that data indicates:

- The interpreted groundwater flow directions are the same as presented in previous reports.
- Monitoring well 8 (MW-8) was not measured due to obstruction in well.
- No methane was detected at any site monitoring locations.
- All of the water samples, collected from on-site monitoring wells during the June 2002 sampling event, contained detectable levels of at least one of the indicator parameters of $\text{NH}_3\text{-N}$, COD, Cl^- , and TSS above the levels measured in the upgradient background monitoring well (MB-10) with the exception MB-1, which did not have any indicator parameters levels above the background monitoring well.
- Calculated concentrations of un-ionized ammonia did not exceed the acute aquatic criteria (AAC) at any sample location.
- Calculated concentrations of un-ionized ammonia exceeded the chronic aquatic criteria (CAC) at downgradient locations MB-2, MB-6, MB-7, and MB-8. However, after performance of the mixing calculations for the river, the calculated $\text{NH}_3\text{-N}$ concentrations no longer exceeded the criteria.

3.0 COMMENTS

Further discussion of each comment can be noted in the data validation reports found in Appendix B.

FIGURES

Figure 1.
Site Location
Marion (Bragg) Landfill

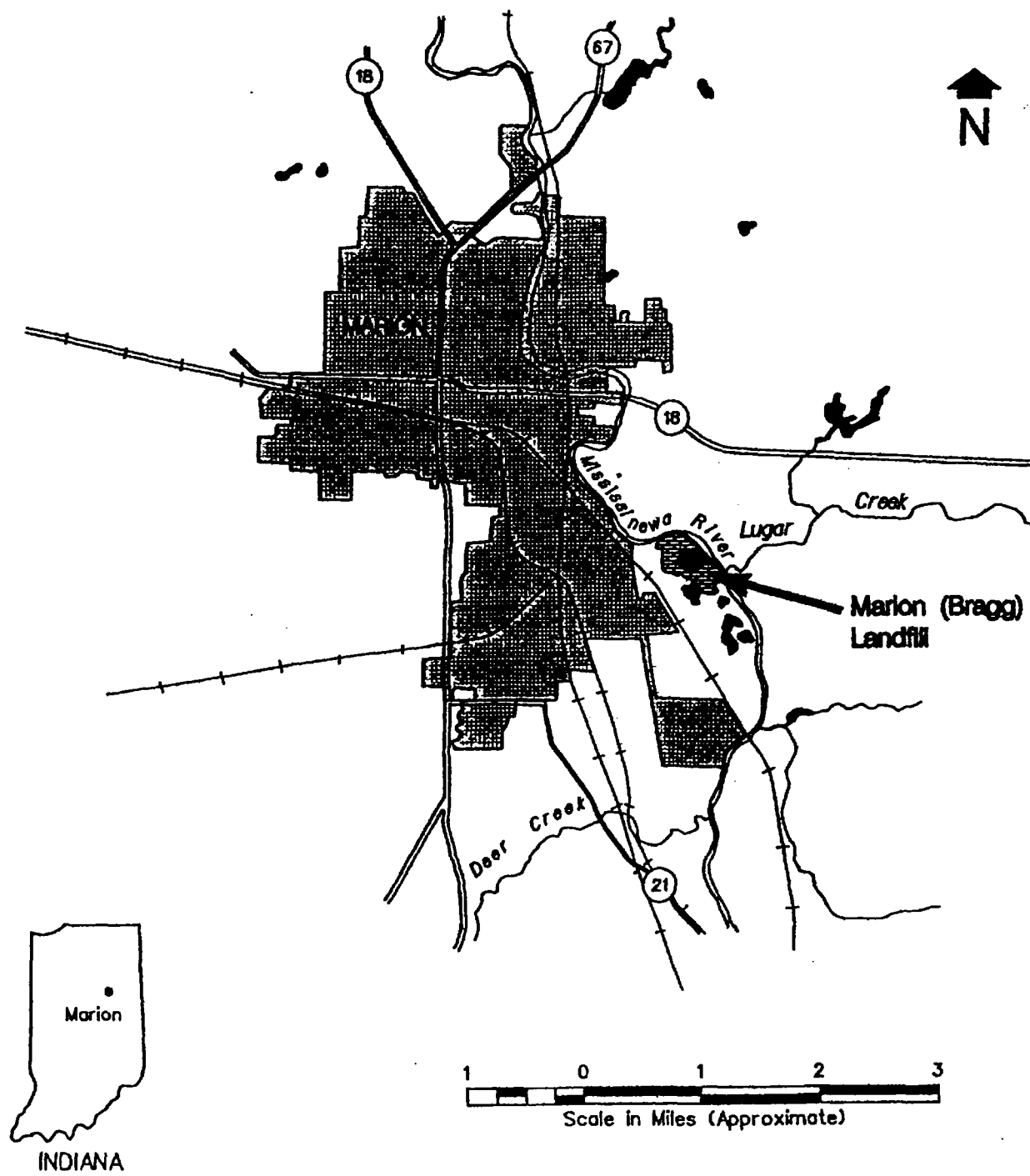


Figure 2
Sampling Locations
Marion (Bragg) Landfill

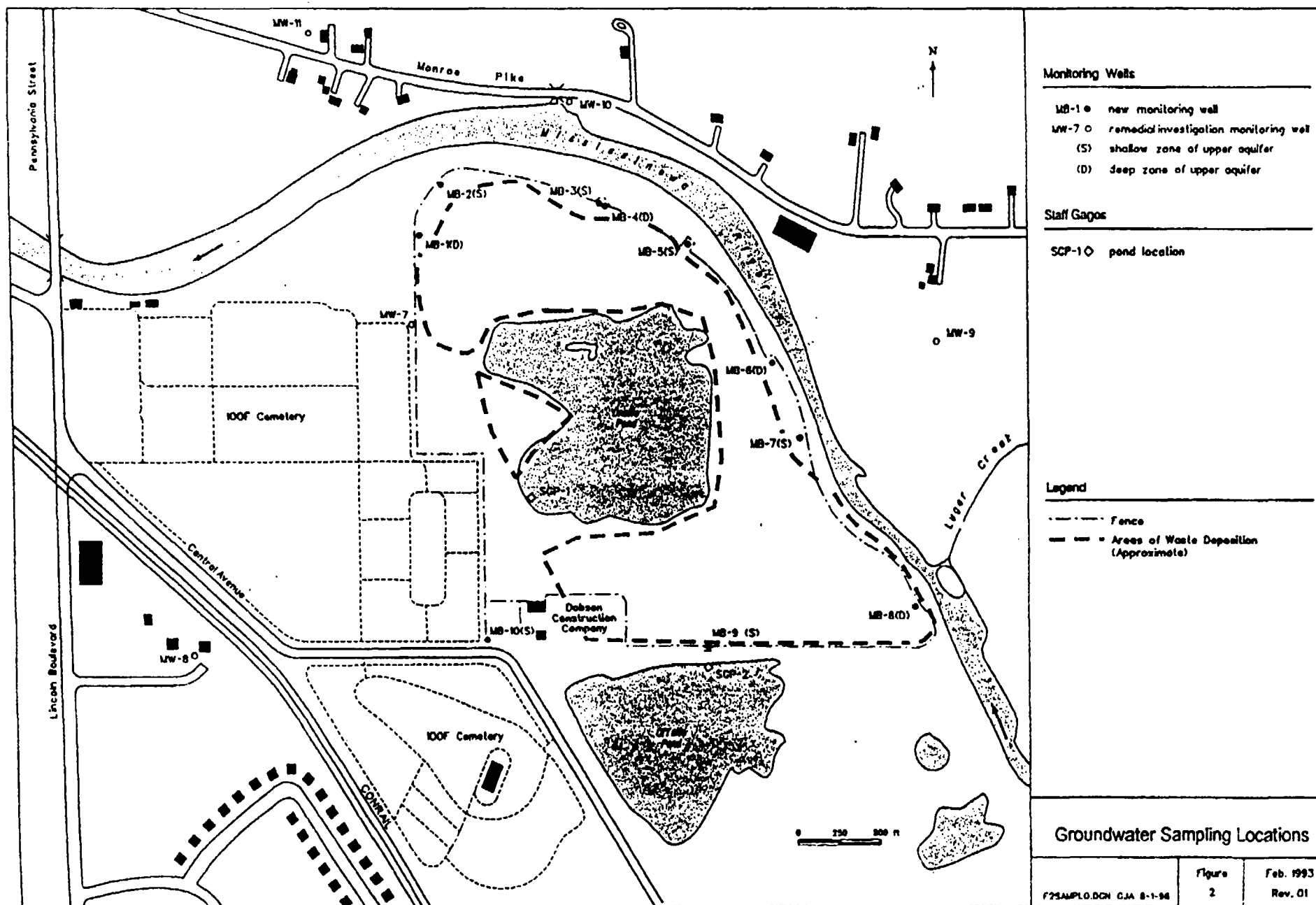
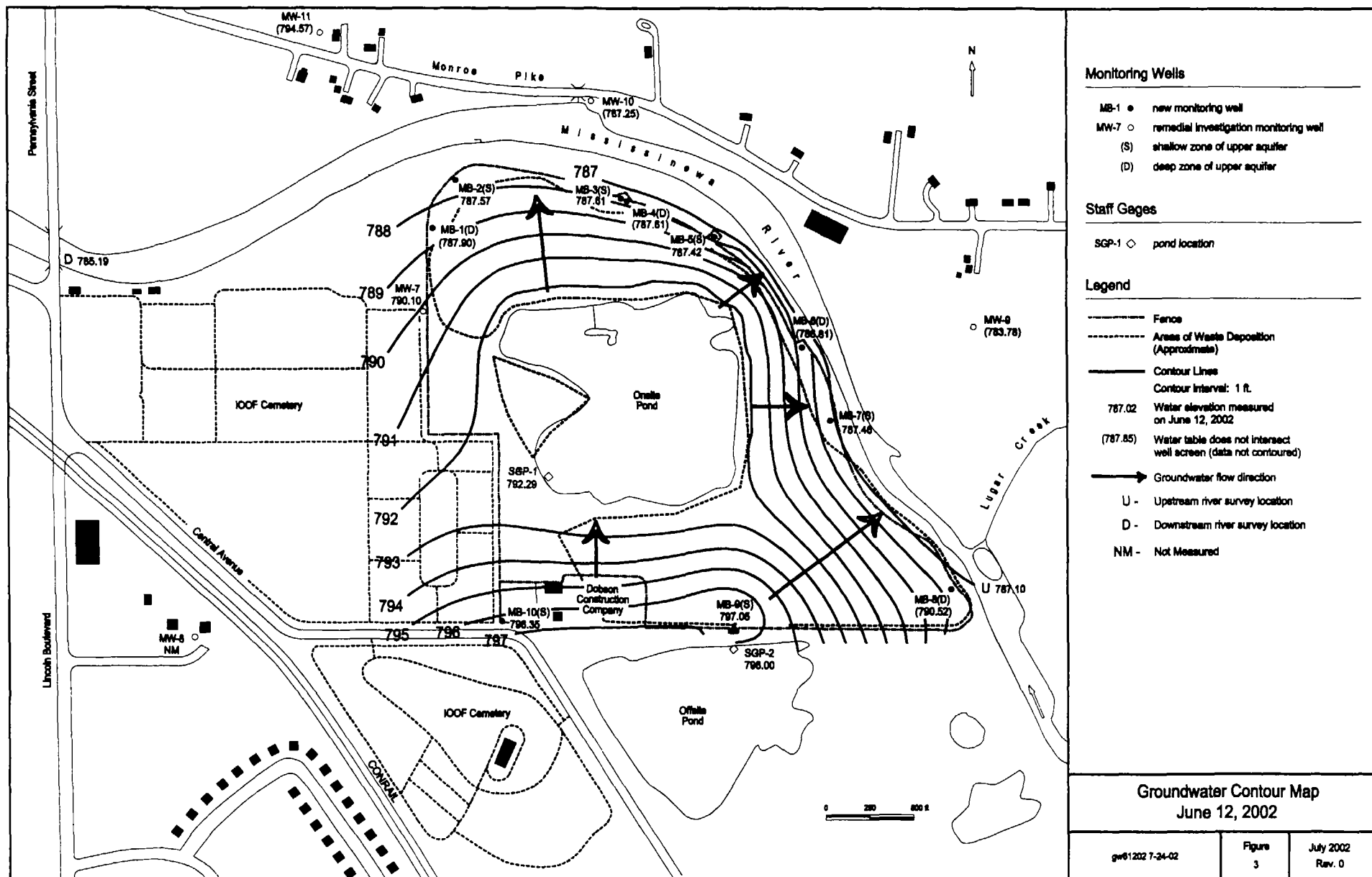


Figure 3
Groundwater Contour Map
Marion (Bragg) Landfill



Groundwater Contour Map
June 12, 2002

gw61202 7-24-02

Figure
3

July 2002
Rev. 0

Figure 4. Hydrograph for
Off-site Monitoring Wells

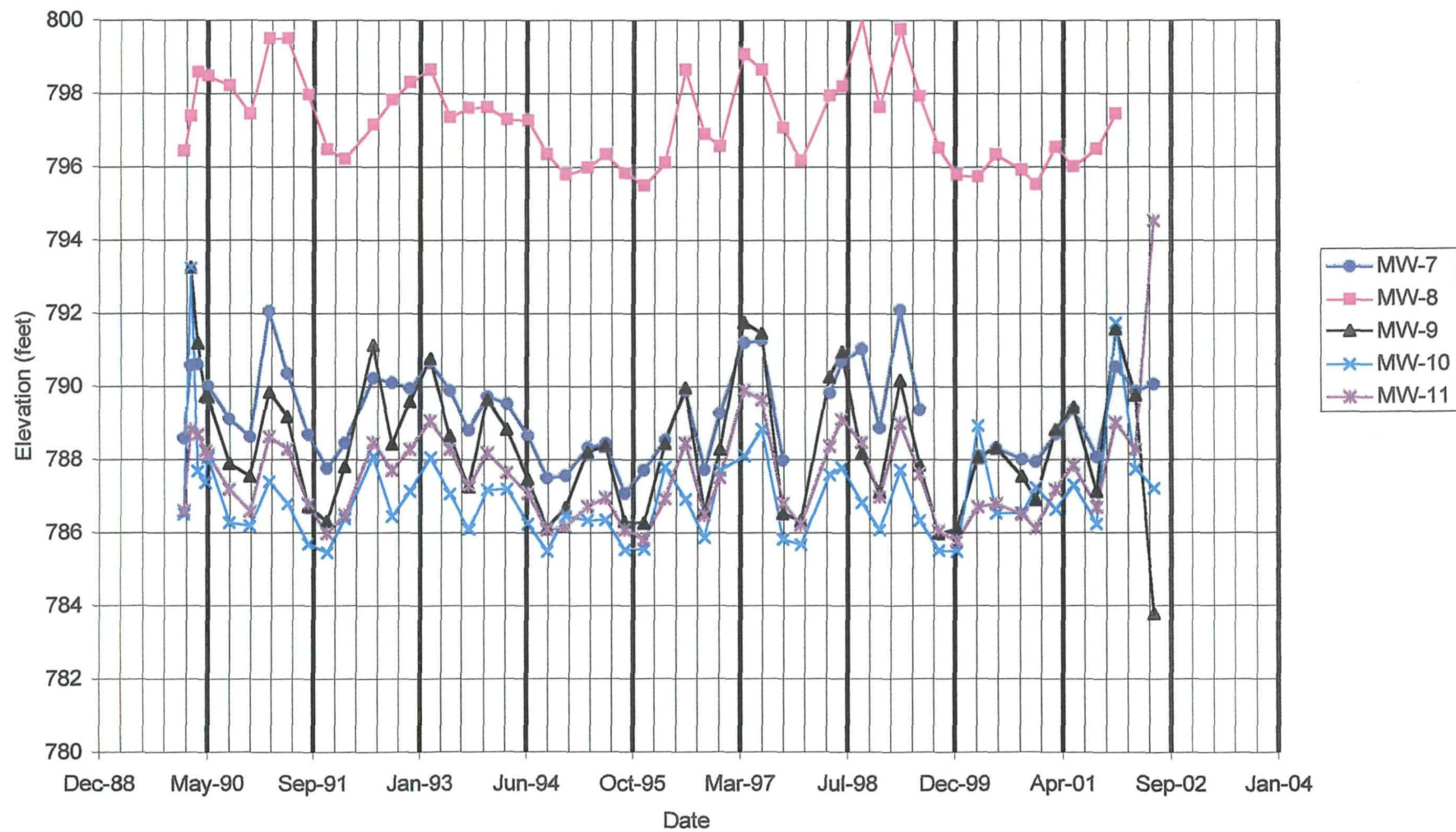


Figure 5. Hydrograph for Shallow,
Upper Aquifer Monitoring Wells

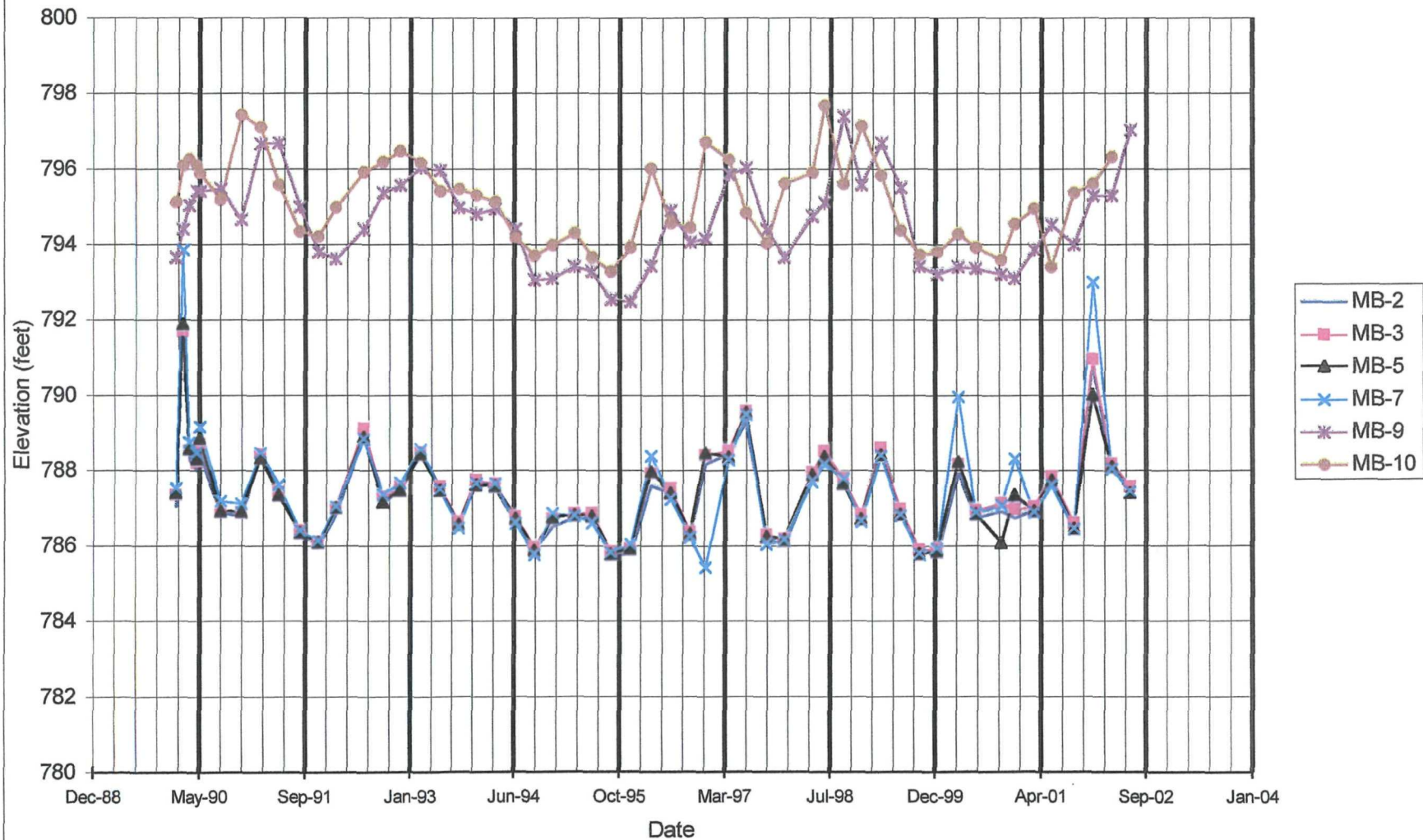


Figure 6. Hydrograph for Deep,
Upper Aquifer Monitoring Wells

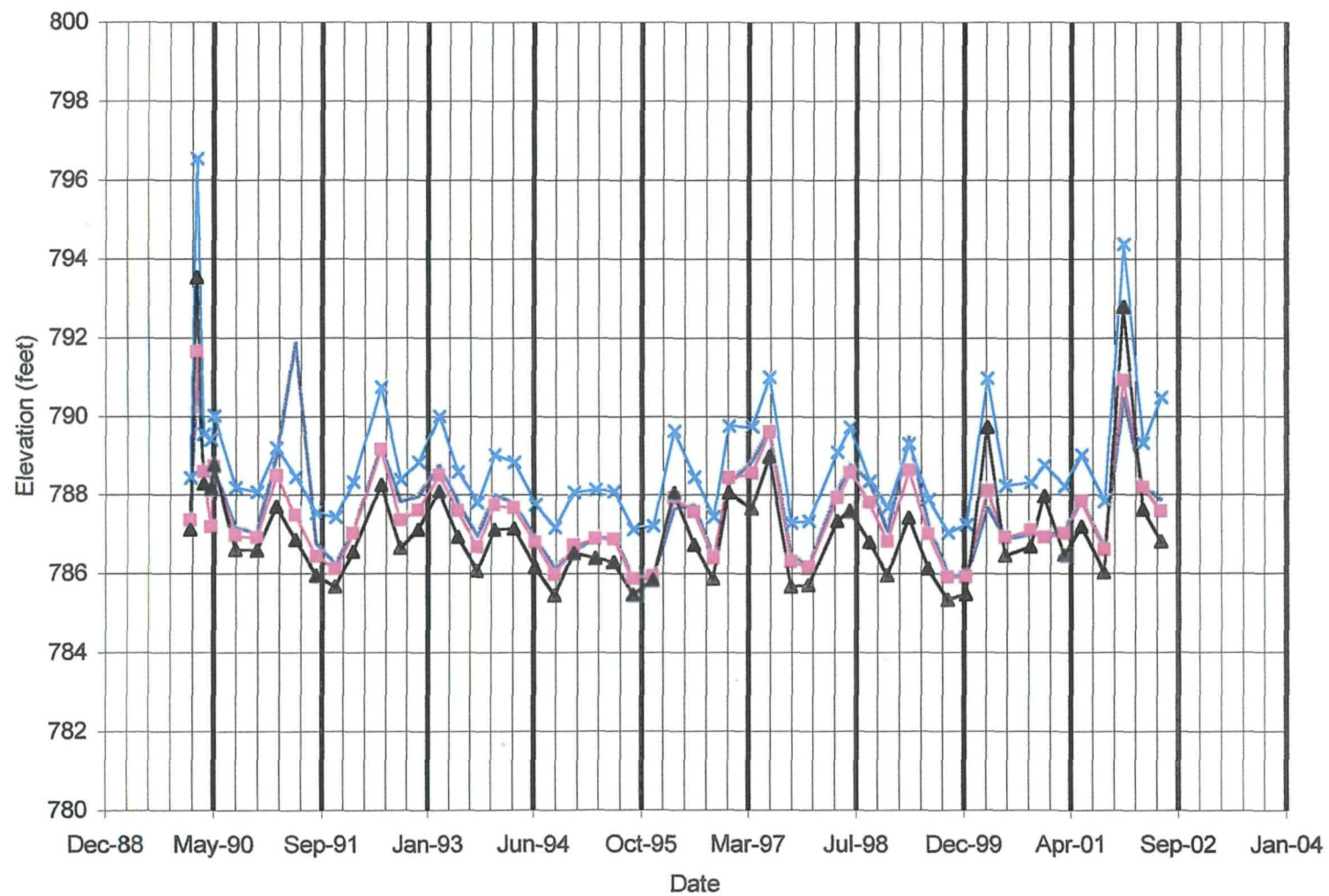
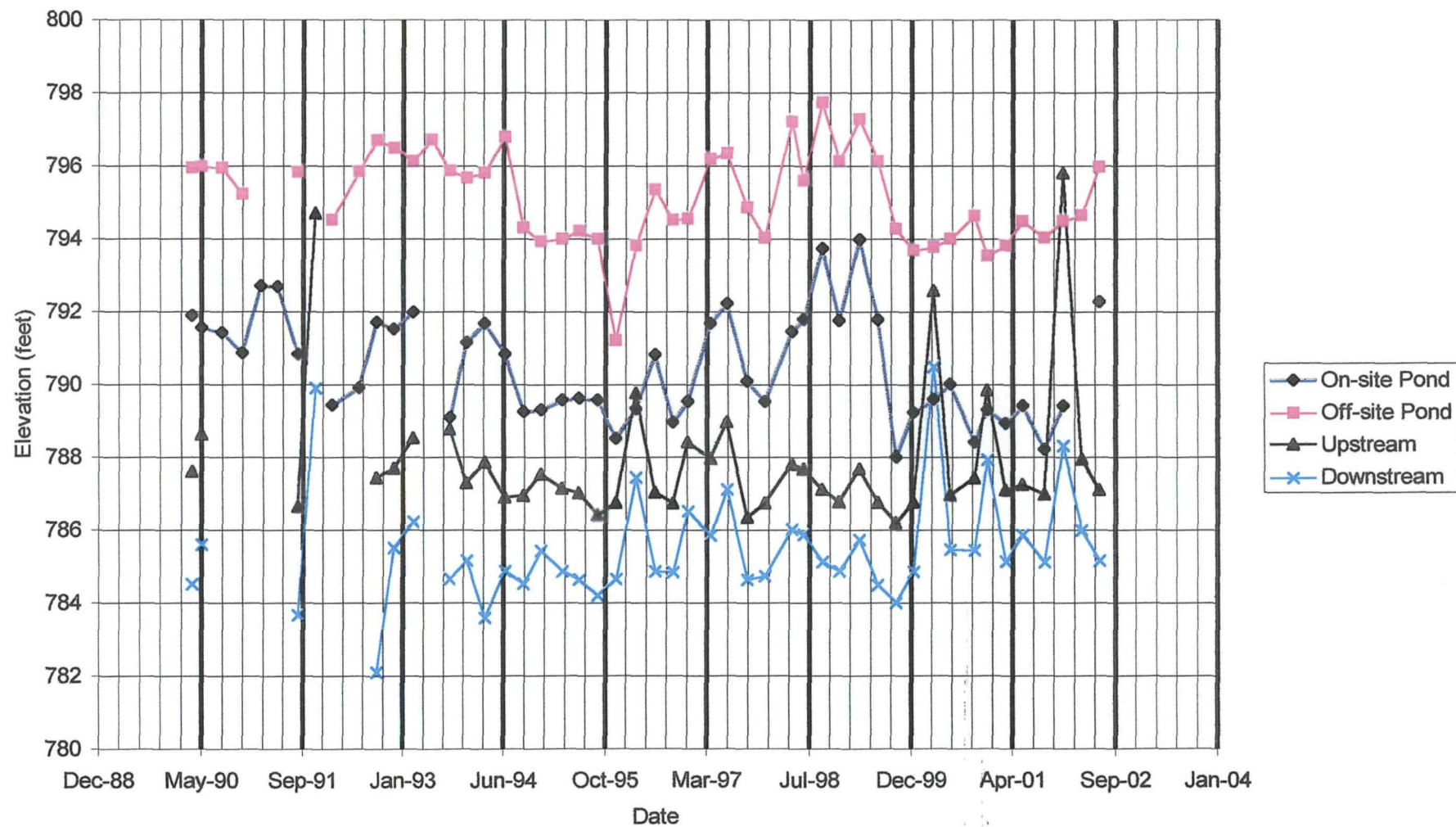


Figure 7. Hydrograph for
Surface Water Locations



TABLES

Table 1
SAMPLE SUMMARY MATRIX - MARION (BRAGG) LANDFILL

Matrix	Number of Samples	Number of Trip Blanks*	Number of Field Blanks*	Number of Field Duplicates	Number of Matrix Spike/ Spike Duplicate Samples **	Matrix Total Matrix	Analyses	Container and Preservation	Holding Times
GROUND WATER (Quarters between the semi-annual sampling when only the IDEM Parameter is to be sampled.)	8 (Note 1)		1	1	2	12	LABORATORY		
							TSS	1-1L plastic Cool to 4C	3 days
							Chloride	1-250ml plastic Cool to 4C	28 days
							NH3-N	1-1L plastic H2SO4 to pH less than 2.	28 days
							COD	1-250ml plastic H2SO4 to pH less than 2.	28 days
							FIELD		
							pH, Conductivity, D.O. and Temp.	Measure in field immediately after collection.	

Note 1: Wells MB-3 and MB-4 were not sampled this quarter as part of an interim reduced monitored program following a "No further action" ROD.

* - Trip blanks are required for volatile organic analysis at a frequency of one per cooler shipped containing volatile organic analysis.

** - Triple the volume for groundwater and surface water locations will be collected for matrix spike/matrix spike duplicate analyses at a frequency of one per 20 investigative samples.
Inorganic analyses will include a single matrix spike and a laboratory duplicate vs. matrix spike duplicate.

**TABLE 2: WATER LEVEL AND METHANE MONITORING DATA, MARION (BRAGG) LANDFILL,
JUNE 12, 2002**

Monitoring Location	Top of Casing Elevation (ftmsl)	Stickup (ft)	Ground Surface Elevation (ftmsl)	Methane Concentration (%)	Water Level (ftbtoc)	Water Elevation (ftmsl)
MB-1	799.57	2.50	797.07	0.0	11.87	787.90
MB-2	801.75	2.80	798.95	0.0	14.18	787.57
MB-3	806.15	2.70	803.45	0.0	18.54	787.81
MB-4	805.95	2.80	803.35	0.0	18.35	787.81
MB-5	809.87	3.00	803.87	0.0	19.45	787.42
MB-6	803.58	3.50	800.08	0.0	18.77	786.81
MB-7	812.73	3.00	809.73	0.0	25.27	787.46
MB-8	810.73	3.00	807.73	0.0	20.21	790.52
MB-9	814.73	2.80	811.93	0.0	17.88	797.05
MB-10	822.35	3.10	819.25	0.0	26.00	796.35
MW-7	802.36	2.82	799.54	0.0	12.26	790.10
MW-8	810.87	3.08	807.79	NM	NM	
MW-9	806.04	2.87	803.47	0.0	22.26	783.78
MW-10	803.17	2.27	800.90	0.0	15.92	787.25
MW-11	811.09	2.83	808.26	0.0	18.52	794.57
Staff Gauges	Elev. at the 0 mark on the staff gauge				Measurement of water level on staff gauge (4)	
SGP-1 (4)	791.17	NA	NA	NM	1.12	792.29
	Top of Staff Gauge Elevation				Distance Below Top of Staff Gauge (1)	
SGP-2	798.18	NA	NA	NM	2.18	796.00
River Elevation	Benchmark Elevation				Surveyed Distance	
Upstream location (2)	810.73	NA	NA	NM	23.83	787.10
Downstream location (3)	798.94	NA	NA	NM	11.75	785.19

Notes:

- Stickup - Measured distance between the ground surface and the top of casing
- ftmsl - feet above mean sea level
- ftbtoc - feet below top of casing. For staff gauges, value presented is measurement (in feet) below level of staff gauge.
- (1) Pond water level measured from surveyed top of staff gauge down to pond water.
- (2) Elevations determined by surveying to known benchmark elevations; benchmark for upstream location MB-8 top of casing.
- (3) Elevations determined by surveying to known benchmark elevations; benchmark for downstream location is concrete spillway on east side of McFeeley Bridge.
- (4) O&M Inc. reinstalled and resurveyed during the second quarter sampling event.
- SGP-1 - On-Site Pond
- SGP-2 - Off-Site Pond
- NM - Not Measured
- NA - Not Applicable

TABLE 3: FIELD WATER QUALITY MEASUREMENTS CONDUCTED DURING WELL PURGING, JUNE 2002

Well I.D.	Total Depth (ft)	Approx Stickup (ft)	Depth to Water (ftboc)	Casing Volume (gal)	Date	Volume Pumped (gal)	pH	Temp (C)	Specific Conductance (umhos/cm) (1)	Specific Conductance (umhos/cm) (2)	Dissolved Oxygen (mg/L)	Conversion Factor (K)
MB-1	37	2.50	11.67	4.10	06/13/02							
						12.5	7.1	14.5	650	815	3.8	0.99
						13.0	7.2	15.0	650	804	3.9	0.99
						13.5	7.3	15.0	650	804	3.4	0.99
MB-2	18	2.80	14.18	0.62	06/13/02							
						2.0	6.7	15.0	810	1002	2.4	0.99
						2.5	6.8	14.0	800	1015	2.6	0.99
						3.0	6.8	14.0	810	1028	2.4	0.99
MB-3	24	2.70	18.54	0.88	* (Well removed from water quality monitoring program as part of a condensed monitoring program following a no-further-action Record of Decision.)							
MB-4	35	2.60	18.35	2.70	* (Well removed from water quality monitoring program as part of a condensed monitoring program following a no-further-action Record of Decision.)							
MB-5	24	3.00	19.45	0.74	06/13/02							
						2.5	7.0	15.0	1000	1238	2.6	0.99
						3.0	7.0	15.0	1050	1299	2.6	0.99
						3.5	7.0	15.0	1000	1238	2.5	0.99
MB-6	28	3.50	16.77	1.82	06/13/02							
						5.5	6.6	15.5	810	990	1.2	0.99
						6.0	6.6	15.0	820	1015	1.3	0.99
						6.5	6.7	15.0	810	1002	1.3	0.99
MB-7	32	3.0	25.27	1.09	06/13/02							
						3.5	6.9	16.0	800	966	1.4	0.99
						4.0	6.9	16.0	800	966	1.3	0.99
						4.5	6.9	16.0	800	966	1.5	0.99
MB-8	36	3.0	20.21	2.56	06/13/02							
						7.5	7.0	15.0	1220	1510	2.0	0.99
						8.0	7.1	15.0	1250	1547	1.8	0.99
						8.5	7.1	14.5	1250	1566	1.9	0.99

TABLE 3: FIELD WATER QUALITY MEASUREMENTS CONDUCTED DURING WELL PURGING, JUNE 2002

Well I.D.	Total Depth (ft)	Approx Stickup (ft)	Depth to Water (ftbtoc)	Casing Volume (gal)	Date	Volume Pumped (gal)	pH	Temp (C)	Specific Conductance (umhos/cm) (1)	Specific Conductance (umhos/cm) (2)	Dissolved Oxygen (mg/L)	Conversion Factor (K)
MB-9	29	2.80	17.68	1.83	06/13/02	5.5	7.5	13.0	380	495	2.1	0.99
						6.0	7.6	12.5	340	449	2.3	0.99
						6.5	7.6	13.5	380	489	2.0	0.99
MB-10	30	3.10	26.00	0.65	06/13/02	2.0	7.1	15.0	650	804	6.7	0.99
						2.5	7.1	15.0	630	780	6.7	0.99
						3.0	7.2	15.0	600	743	6.8	0.99

Notes:

NA - Not Applicable

ftbtoc - feet below top of case

stickup - measured distance between the ground surface and the top of casing

(1) - Field measured conductivity.

(2) - Specific conductance value corrected to 25 C and adjusted using conversion factor (K).

Table 4
Data Qualifier Definitions

Qualifier	Description
U	The analyte was analyzed for, but was not detected above the reported sample quantitation limit.
J	The analyte was positively identified; the numerical value is the approximate concentration of the analyte in the sample.
N	The analysis indicates the presence of an analyte for which there is presumptive evidence to make a "tentative identification".
NJ	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated value represents its approximate concentration
UJ	The analyte was not detected about the reported sample quantitation limit. However, the reported quantitation limit is approximate and may or may not represent the actual limit of quantitation necessary to accurately and precisely measure the analyte in the sample.
R	The sample results are rejected due to serious deficiencies in the ability to analyze the sample and meet quality control criteria. The presence or absence of the analyte cannot be verified.

Table 5
Marion (Bragg) Landfill
Sample Designation Key
Second Quarter 2002 Sampling Event
June 2002

Sample Designation	Sample Location	Parameters	Date Collected
Ground Water			
GW01PB	MB-10	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02
GW02PB	MB-9	TSS, Cl ⁻ , COD, NH ₃ -N,	6/13/02
GW03PB	MB-5	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02
GW04PB	MB-6	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02
GW05PB	MB-7	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02
GW06PB	MB-8	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02
GW07PB	MB-2	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02
GW08PB	MB-1	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02
GW08DPPB	MB-1	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02
GW08MSPB	MB-1	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02
GW08MSDPB	MB-1	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02
GW09FBPB	Field Blank	TSS, Cl ⁻ , COD, NH ₃ -N	6/13/02

Table 6: GROUNDWATER CHEMISTRY DATA, JUNE 2002

MONITORING WELL	MB-1	MB-2	MB-5	MB-6	MB-7	MB-8	MB-9	MB-10	DUPLICATE *
LOCATION IN AQUIFER	BOTTOM	TOP	TOP	BOTTOM	TOP	BOTTOM	TOP	TOP	(MB-1)
INDICATOR PARAMETERS (mg/L)									
Ammonia-nitrogen	0.10 U	6.9	0.55	4.7	6.1	7.0	0.46	0.10 U	0.10 U
C.O.D.	10 UJ	28 J	30 J	41 J	26 J	111	28 J	19 J	10 J
Chloride	23.8 UJ	11.4 UJ	21.5 UJ	14.8 UJ	26.7 UJ	30.6 UJ	12.7 UJ	22.7 UJ	23.9 UJ
TSS	9.6 J	96.4 J	30 J	288 J	260 J	951 J	110 J	107 J	13.0 J

Notes: * - Duplicate sample collected from monitoring well MB-1

TABLE 7: WATER QUALITY CRITERIA - UPDATED 2000

Parameter	Acute Aquatic Criteria	Chronic Aquatic Criteria	Human Health	MCL
TCL Volatiles (ug/L)				
Acetone	10000 +	222 +	--	--
Benzene	5300 E	118 +	400 I	5 E
Chlorobenzene	1950 +	50 E	2026 +	--
1,2-Dichloroethene (total) (1)	--	--	--	70 and 100 E
Methylene Chloride	193000 E	4289 +	157 E	--
Toluene	17500 E	389 +	424000 I	1000 E
Trichloroethene	--	9400 E	--	5 E
Trichloroethene	4500 E	21900 E	807 I	5 E
Vinyl Chloride	--	--	5246 I	2 E
TCL Semivolatiles (ug/L)				
Phenol	10200 E	2560 E	3500 E	--
Phthalate Esters	940 E	3 E	50000 I	--
TAL Metals and Cyanide (ug/L)				
Aluminum	--	--	--	--
Antimony	--	--	45000 I	8 E
Arsenic	380 I	190 I	0.175 I	50 E
Barium	--	--	--	2000 E
Beryllium	--	--	1.17 I	4 E
Cadmium*	6.7 I	1.6 I	60 +	5 E
Calcium	--	--	--	--
Chromium	16 I	11 I	3389 +	100 E
Cobalt	--	--	--	--
Copper* (2)	26 I	18 I	--	1300 E
Cyanide	22 I	5.2 I	24242 +	200 E
Iron	1000 E	--	--	--
Lead* (2)	150 I	5.8 I	51 +	15 E
Magnesium	--	--	--	--
Manganese	--	--	--	--
Mercury	2.4 I	0.012 I	0.15 I	2 E
Nickel*	2100 I	240 I	100 I	100 E
Potassium	--	--	--	--
Selenium	130 I	25 I	--	50 E
Silver*	9.2 I	0.12 E	--	50 E
Sodium	--	--	--	--
Thallium	--	--	48 I	2 E
Vanadium	11000 +	100 +	--	--
Zinc*	175 I	160 I	--	--
IDEM Parameters (mg/L)				
Ammonia, Total Un-ionized**	0.027 I	0.0029 I	--	--
COD	--	--	--	--
Chloride	860 I	230 I	--	--
TSS	--	--	--	--

Notes:

*Acute and chronic criteria calculated based on worst-case hardness=181 mg/L

**Acute and chronic criteria calculated based on worst-case t=5C, pH=7.0

-- Criteria not developed

MCL - Maximum Contaminant Level (Updated per the Safe Drinking Water Act of 1986 and later revisions known as the Phase I, Phase II, and Phase V rules. Phase I became effective January 9, 1989, Phase II became effective in 1992, and Phase V became effective January 17, 1994.)

Source of Data

E - U.S. EPA

I - IDEM (327 IAC 2)

+ - See section 6.2 of February 1990 report by Beek Consultants Limited Baseline Water Quality Conditions for discussion of sources for the criteria.

(1) The 1,2-Dichloroethene MCL standards are divided into cis-1,2-Dichloroethene at 70 ug/L and trans-1,2 Dichloroethene at 100 ug/L.

(2) - The "MCL" value is an action level for lead and copper (i.e., the lead and copper rule) but it only applies to water supplies as measured at the household tap

**TABLE 8: CALCULATED ACUTE AQUATIC CRITERIA AND CHRONIC AQUATIC CRITERIA
FOR AMMONIA-NITROGEN, JUNE 2002**

Sample Matrix	Well Number	pH	Temp (C)	Total Ammonia In Sample	Calculated Unionized Ammonia (in Sample)	Calculated Un-ionized Ammonia Criteria (mg/L)**		Criteria Exceeded	
				(mg/L)	(mg/L)*	AAC	CAC	AAC	CAC
Ground Water	MB-1	7.3	15.0	0.10 U	0.0003	0.081	0.0111	No	No
	MB-2	6.8	14.0	6.9	0.0098	0.032	0.003	No	Yes
	MB-5	7.0	15.0	0.55	0.0014	0.051	0.0054	No	No
	MB-6	6.7	15.0	4.7	0.0059	0.029	0.0026	No	Yes
	MB-7	6.9	16.0	6.1	0.0153	0.051	0.0053	No	Yes
	MB-8	7.1	14.5	7.0	0.0237	0.062	0.0072	No	Yes
	MB-9	7.6	13.0	0.46	0.0045	0.103	0.021	No	No
	MB-10	7.2	15.0	0.10 U	0.0002	0.072	0.0088	No	No
	Duplicate+	7.3	15.0	0.10 U	0.0003	0.081	0.0111	No	No

Notes:

* - Values calculated according to the Indiana Register (1990) (327 IAC 2). Unionized values calculated using 1/2 the detection limit for those samples with results qualified by "U" (i.e., non-detect).

** - Calculated according to the USEPA Quality Criteria for Water, 1986 EPA 440/5-86-001 (as revised by Water Quality Criteria and Standards Activity Report, August 1992)

- Duplicate sample taken from monitoring well MB-1; used MB-1 readings for duplicate pH and temperature readings.

AAC - Acute Aquatic Criteria

CAC - Chronic Aquatic Criteria

TABLE 9: COMPARISON OF ADJUSTED RESULTS TO APPLICABLE WATER QUALITY CRITERIA, JUNE 2002

Parameter	Matrix	Sample Location	Monitoring Well Zone (1)	Sample Concentration (mg/L)	Criterion Exceeded	Criterion Concentration (mg/L)	Source	Average (1) Concentration Of Zone (mg/L)	Exceeds Criterion	Concentration After Mixing (mg/L) (2)	Exceeds Criterion
Indicator Parameters				(mg/L)		(mg/L)		(mg/L)		(mg/L)	
Unionized	Groundwater	MB-2	I	0.0098	CAC	0.003	E	0.0105	Yes	0.000006	No
Ammonia (mg/L)	Groundwater	MB-6	II	0.0059	CAC	0.0026	E	0.0057	Yes	0.000003	No
	Groundwater	MB-7	III	0.0153	CAC	0.0053	E	0.0195	Yes	0.000011	No
	Groundwater	MB-8	III	0.0237	CAC	0.0072	E	0.0195	Yes	0.000011	No

Notes:

CAC - Chronic Aquatic Criteria
E - U.S. EPA

(1) Refer to the Environmental Resources Management (ERM) Remedial Action Plan for Marion (Bragg) Landfill Site, Marion, Indiana, dated 1989, for definition of monitoring well zones and concentration calculations.

(MB-1 and -2 are zone I, MB-3, -4, -5, and -6 are zone II, and MB-7 and -8 are zone III)

(2) Refer to the Camp, Dresser, and McKee (CDM) Remedial Investigation Report, dated 1987, for mixing zone calculations.

Duplicate sample collected from MB-1

APPENDIX A
Chain-of-Custody Forms

CHAIN-OF-CUSTODY RECORD

No. 065722

Project Name: <u>Marion Briggs</u>		Client Address: <u>363 N. Indiana St.</u>		Point-of-Contact: <u>P. Burton</u>	
Carrier: <u>Fed Ex</u>		Telephone No.: <u>317 716 3688</u>		Sampling complete: <u>Y</u> N (see Note 1)	
Airbill No.: <u>8253607B149</u>		Sampler Signature: <u>[Signature]</u>		Project-specific (PS) or Batch (B) QC? <u>PS</u>	
Sampler Name: <u>W. Peter Burton</u>		BOX #3 F. Filtered U. Unfiltered		BOX #4 H. High M. Medium L. Low	
BOX #1 1. Surface Water 6. Trip Blank 7. Oil 8. Waste 9. Other		BOX #2 A. HCl + Ice B. HNO3 + Ice C. NaOH + Ice D. H2SO4 + Ice E. Unpreserved J. D + F		BOX #5 C. CLP 350 S. SW-846 W. CWA 800-series O. Other	

Sample ID (9 characters maximum)			Date/Year	Time	Box #1	Box #2	Box #3	Box #4	Box #5	Method	No. of Bottles	Use for Lab QC (MS or DUP)	VOA	SVOC	Pesticide	PCB	Herbicide	Metals / Mercury	Cyanide	TOC / TOX	O&G / TPH	TSS/Cl	COB	NH ₂ -2	Remarks / Comments (see Notes 2 & 3)		
GW01PB			6/13/2002	08:02	2	5	3	7	5	5	3											X	X	X	X		TSS/Cl - ICC
GW02PB			11/18/35																							COB/NH ₂ N - H ₂ SO ₄	
GW03PB			11/09/33																							ICC	
GW04PB			11/10/00																								
GW05PB			11/10/20																								
GW06PB			11/09/05																								
GW07PB			11/10/45																								
GW08PB			11/11/30																								
GW09PB			11/11/11																								
GW10PB			11/11/11																								

Client's Special Instructions: Pls record pH of samples and Temp of containers on CAC upon receipt Temperature °C

Lab: Received in Good Condition? Y or N Describe Problems, if any:

#1 Relinquished By: (Sig) <u>[Signature]</u>	Date: <u>6/13/02</u>	#2 Relinquished By: (Sig)	Date:
Company Name: <u>Canute</u>	Time: <u>14:00</u>	Company Name:	Time:
#1 Received By: (Sig)	Date:	#2 Received By: (Sig)	Date:
Company Name:	Time:	Company Name:	Time:

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; if "Y" lab will begin processing batches now.
Note (2): Samples stored 60 days after date report mailed at no extra charge.
Note (3): All lab copies of data destroyed after three years.



COMPUCHEM

a division of Liberty Analytical Corp.

501 Madison Avenue
Cary, NC 27513
1-800-833-5097

CHAIN-OF-CUSTODY RECORD

No. 063723

Project Name: <u>Marion Bridge</u>	Client Address: <u>Carmel</u>	Point-of-Contact: <u>P. Butler</u>
Carrier: <u>Fed Ex</u>	<u>Dr. Williams</u>	Telephone No.: <u>317 714 3040</u>
Airbill No.: <u>7205607711</u>		Sampling complete? (Y or N) (see Note 1) <u>Y</u>
Sampler Name: <u>Lee Ferrell</u>	Sampler Signature: <u>[Signature]</u>	Project-specific (PS) or Batch (B) QC? <u>PS</u>

BOX #1 1. Surface Water 2. Ground Water 3. Leachate 4. Rinse 5. Soil / Sediment / Sludge 6. Trip Blank 7. Oil 8. Waste 9. Other <u>Blank</u>	BOX #2 A. HCl + Ice B. HNO ₃ + Ice C. NaOH + Ice D. H ₂ SO ₄ + Ice E. Unpreserved F. Ice Only G. Other H. NaHSO ₄ + Ice I. ZnAc+NaOH + Ice J. D+F	BOX #3 F. Filtered U. Unfiltered	Box #4 H. High M. Medium L. Low	Box #5 C. CLP 3/90 S. SW-846 W. CWA 600-series O. Other
--	--	---	---	--

Sample ID (9 characters maximum)	Date: Year <u>2002</u>	Time	Box #1 Matrix	Box #2 Preservative	Box #3 Filtered / Unfiltered	Box #4 Expected Conc.	Box #5 Method	No. of Bottles	Use for Lab QC (MS or DUP)	VOA	SVOC	Pesticide	PCB	Herbicide	Metals / Mercury	Cyanide	TOC / TOX	O&G / TPH	TSS / Cl	CO ₂	NH ₃ -N	Remarks / Comments (see Notes 2 & 3)
GW08MSDPB	6/13	11:30	2	J	U	L	S	3											X	X	X	
GW09XFBPB	6/13	10:35	9	J	J	J	L	4											J	J	N	Extra sample bottle for the rinsate sample * (distilled H ₂ O) *
	/	:																				
	/	:																				
	/	:																				TSS/Cl - Ice
	/	:																				CO ₂ /NH ₃ -N - H ₂ SO ₄ + Ice
	/	:																				
	/	:																				
	/	:																				
	/	:																				

Clients Special Instructions: pls record pH of samples and Temp. of coolers on CDC upon receipt Temperature _____ °C

Lab: Received in Good Condition? Y or N Describe Problems, if any:

#1 Relinquished By: (Sig) <u>[Signature]</u>	Date: <u>6/13/02</u>	#2 Relinquished By: (Sig)	Date:	#3 Relinquished By: (Sig)	Date:
Company Name: <u>Carmel</u>	Time: <u>11:00</u>	Company Name:	Time:	Company Name:	Time:
#1 Received By: (Sig)	Date:	#2 Received By: (Sig)	Date:	#3 Received By: (Sig)	Date:
Company Name:	Time:	Company Name:	Time:	Company Name:	Time:

Note (1): If "N" lab will hold samples to await remainder of project-maximizing batch size and minimizing QC ratio; if "Y" lab will begin processing batches now.
 Note (2): Samples stored 60 days after date report mailed at no extra charge.

Note (3): All lab copies of data destroyed after three years.

APPENDIX B
Trillium, Inc.
Data Validation Reports

DATA VALIDATION

FOR

**MARION BRAGG LANDFILL
MARION, INDIANA**

**WET CHEMISTRY ANALYSIS DATA
Chemical Oxygen Demand (COD) in Water**

**CET Report Dated June 27, 2002
June 2002 Sample Collections**

Chemical Analyses Performed by:

**Chemical & Environmental Technology, Inc.
Research Triangle Park, North Carolina**

FOR

**O & M, Inc.
Danville, Indiana**

BY

**Trillium, Inc.
356 Farragut Crossing Drive
Knoxville, TN 37922
(865) 966-8880**

August 28, 2002

EXECUTIVE SUMMARY

Validation of the wet chemistry analysis data (chemical oxygen demand [COD]) prepared by Chemical & Environmental Technology, Inc. (CET), under subcontract to CompuChem Environmental, for nine water samples and one field blank from the Marion Bragg Landfill Site in Marion, Indiana, has been completed by Trillium, Inc. The data were reported by the laboratory in a single data package that had no identification number but was dated June 27, 2002. This data package was received for review on July 8, 2002, with additional documentation provided on July 22, 2002. The following field samples were reported:

GW08PB (MB-1)	GW08DPPB (MB-1D)	GW07PB (MB-2)
GW03PB (MB-5)	GW04PB (MB-6)	GW05PB (MB-7)
GW06PB (MB-8)	GW02PB (MB-9)	GW01PB (MB-10)
GW09FBPB (Field Blank)		

Based on the validation effort, results for COD in all samples except GW06PB were qualified as estimated (J, UJ).

Brief explanations of the reasons for the actions taken above may be found in the Overall Assessment (Section IX). Note that if full documentation of the initial calibrations associated with these analyses is ever produced by the laboratory, it may be possible to remove most of these qualifiers. Details of the validation findings and conclusions based on review of the results for each quality control requirement are provided in the remaining sections of this report.

Documentation issues are discussed in Section VIII.

This validation report should be considered part of the data package for all future distributions of the COD data.

INTRODUCTION

Analyses were performed according to EPA's "Chemical Analysis of Water and Wastes" (EPA-600/4-79-020), March 1983, Method 410.4. Since no guidelines specific to the analytical method used are available, the validation was based on the requirements of the referenced procedure, the specifications of the project-specific Quality Assurance Project Plan (QAPP), and best professional judgment. The validation approach was similar to that described in EPA's "National Functional Guidelines for Inorganic Data Review" (EPA-540/R-94/013, February 1994). Results of sample analyses were reported by the laboratory without qualifications.

The data validation process is intended to evaluate data on a technical basis rather than a contract or method compliance basis. An initial assumption is that the data package contains sufficient raw data documentation to facilitate the validation process, comparable to the level of documentation required in a Contract Laboratory Program (CLP) data package.

During the validation process, laboratory data are verified against all available supporting documentation. Based on this review, qualifier codes may be added by the data validator. Validated results are, therefore, either qualified or unqualified. Unqualified results mean that the reported values may be used without reservation. Final validated results are annotated with the following codes in accordance with EPA's National Functional Guidelines:

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- R - The data are unusable. (Note: The analyte may or may not be present.)
- J - The associated value is an estimated quantity.
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

These codes are recorded on the client-customized data tables (Attachment A) and the laboratory's Final Reports of Analysis (Attachment B) to qualify the results as appropriate according to the review of the data package.

Two facts should be noted by all data users. First, **the "R" qualifier means that the laboratory-reported value is unusable.** In other words, due to significant quality control problems, the analysis is invalid and provides no information as to whether the analyte is present or not. Rejected values should not appear on data tables because they cannot be relied upon, even as a last resort. Second, **no analyte concentration is guaranteed to be accurate even if all associated**

quality control is acceptable. Strict quality control conformance serves only to increase confidence in reported results; any analytical result will always contain some error.

The data user is also cautioned that the validation effort is based on the raw data printouts as provided by the laboratory. Software manipulation cannot be routinely detected during validation; unless otherwise stated in the report, these kinds of issues are outside the scope of this review.

I. Holding Times, Preservation and Sample Integrity

The water samples were collected on June 13, 2002. All COD analyses were conducted well within the 28-day holding time specified by both the referenced method and the QAPP.

An acceptable ($4^{\circ}\text{C} \pm 2^{\circ}\text{C}$) cooler temperature on receipt of the samples at CET (2.5°C) was recorded on the chain of custody (COC) record documenting the shipment of samples from CompuChem to CET. No preservation information was recorded on this COC by CompuChem, and no documentation of sample pH on receipt at CET was found in the data package. However, the use of sulfuric acid and ice was documented on the field COCs (documenting shipment of the samples from the site to CompuChem) and verification of successful acidification of the COD sample containers was documented on CompuChem's receiving log, both of which were provided in CompuChem's data package for the other analysis parameters requested on these samples. Therefore, no action was taken on this basis.

II. Calibrations

The reported COD analyses were performed on 6/17/02. An initial calibration (IC) performed on 6/4/02 was referenced on the analysis bench sheet. No indication of the calibration range or the correlation coefficient for the calibration curve was documented, and the raw data for the IC were not provided, despite being specifically requested from the laboratory (see Section VIII and Attachment C). Repeated attempts to obtain this documentation in support of the March 2002 sample analyses were unsuccessful, and no further attempt was made by the validator to obtain it in support of these data.

A check standard at 75 mg/L was run at the start of the COD analysis series, and a check standard at 150 mg/L was run at the end of the analysis series. Acceptable recoveries (QC 85-115%) were reported for the 75 mg/L standard (95%) and the 150 mg/L standard (102%). In the absence of raw data for the associated IC, neither of the check standard results could be verified by the validator.

In the absence of the raw IC data, the validator cannot verify that the linear regression used to calculate sample results was acceptable (i.e., that it had an acceptable correlation coefficient). The available information also does not specify the actual calibration range (in particular, the low standard concentration is not known) and does not indicate how many standards were used to establish the calibration. See Section VII for further discussion.

III. Blanks

A blank was run at the start and end of the COD analysis series. No absorbance response at 600 nanometers was documented for either of these blanks.

One field blank, GW09FBPB, was submitted with this sample set. COD was not detected above the laboratory-specified reporting limit (RL) of 10 mg/L in the field blank.

IV. Laboratory Control Samples (LCS)

No LCS was run in association with these samples.

V. Laboratory and Field Duplicate Analyses

A. Laboratory Duplicates

None of the samples in this data set were run in duplicate by the laboratory.

Duplicate analysis of an unrelated sample was recorded on the analysis run log. These data are not relevant to the Marion Bragg site samples, and were not considered in the validation effort.

B. Field Duplicates

Sample GW08DPPB was identified as a field duplicate of GW08PB. COD was detected at a concentration equivalent to the laboratory-specified RL (10 mg/L) in GW08PB, but was not detected (10 U mg/L) in GW08DPPB. This discrepancy probably reflects the increased variability inherent near the RL. Based on professional judgment, results for COD in GW08PB and GW08DPPB were qualified as estimated (J, UJ) due to this lack of confirmation.

VI. Matrix Spike Analysis

No spiked sample analyses were reported in association with this data set.

VII. Sample Results Verification

All sample results for COD were accurately transcribed from the bench sheet by the laboratory. However, in the absence of raw data for the associated IC, the reported sample concentrations could not be verified by the validator. Since the lowest concentration at which accurate recovery was demonstrated in association with these analyses was 75 mg/L (see Section II), all sample results less than 75 mg/L were qualified as estimated (J, UJ). Note that if full documentation of the initial calibrations associated with these analyses is ever produced by the laboratory, it may be possible to remove these qualifiers.

An RL of 10 mg/L was specified by the laboratory for all non-detected results. Since the calibration ranges established by the ICs were not documented in the data package, the validity of this RL could not be verified by the validator.

All sample results were greater than or equal to 10 mg/L. With the exception of the result for GW06PB, which was greater than 100 mg/L and was reported to three significant figures, all of the sample results were reported to two significant figures by the laboratory; this is consistent with the results found on the bench sheet. Although the historical data generated in support of this project reflect three significant figures for results that are greater than 10 mg/L, the sample results calculations cannot be performed by the validator without the IC raw data and it would not be correct to simply add a decimal place of ".0" to each of the reported values. Therefore, no corrections were made to the reported results with respect to significant figures despite the inconsistency with historical data.

The data tables in Attachment A list all individual sample analyte results, whether or not the value or qualifier was affected by the findings of the validation effort.

VIII. Documentation

Field-initiated COC records were not included in the COD data package, but were available in the CompuChem data package for the other analysis parameters run on these samples. A single COC record documenting transfer of the samples from CompuChem to CET was present; all samples reported in this data set were listed on this form. The following issues were noted:

- Preservation of the samples with sulfuric acid and ice was not recorded on the interlaboratory COC by CompuChem at the time of shipment, and sample pHs were not recorded on the COC by CET on receipt of the samples.
- No courier information was documented, nor was a copy of the courier airbill (if applicable) included in the data package.
- The date accompanying the first "Relinquished by" signature was incomplete; no year was recorded.
- Improper corrections were observed. To preserve the integrity of these documents, all necessary corrections must be made by drawing a single line through the incorrect entry, inserting the correct information, and initialing and dating the change. Obliterations, unsigned cross-outs, and "write-overs" are not legally defensible.

No IC raw data were provided in the data package, despite a specific request for this information by the validator (see Attachment C). It may be that the IC data are not routinely printed in hard copy form by the laboratory when they are generated. However, since the reported sample

results cannot be verified in the absence of these data, full documentation must be produced, in manual or print-out form, when validation is required.

The COD data package (dated June 27, 2002) was originally received by Trillium on 7/8/02. However, this package contained only results forms and the COC record; no supporting raw data were provided. A written request for the missing documentation, including raw data documentation of the referenced initial calibration(s), was sent to CompuChem on 7/9/02 (see Attachment C). A replacement data package, still dated June 27, 2002, was received by Trillium on 7/22/02. The replacement package included bench sheets for the 6/17/02 sample analysis series, but not for the referenced IC, which was run on 6/4/02. No further action was taken by the validator, and the replacement package, although still incomplete, was the subject of this validation effort.

As discussed throughout this report, these documentation issues directly affect the technical validity of the analytical data generated. They would very likely be problematic if the data were to be used in litigation.

IX. Overall Assessment

Based on the validation effort, reported sample results were qualified as follows:

- Results for COD in all samples except GW06PB were qualified as estimated (J, UJ) because these results are all less than 75 mg/L, which is the lowest concentration at which accurate recovery was demonstrated in association with these analyses. Note that if full documentation of the initial calibrations associated with these analyses is ever produced by the laboratory, it may be possible to remove these qualifiers.
- Based on professional judgment, results for COD in GW08PB and GW08DPPB were qualified as estimated (J, UJ) due to lack of confirmation at a low concentration in the laboratory duplicate analyses.

Documentation issues are discussed in Section VIII.

This validation report should be considered part of the data package for all future distributions of the COD data.

ATTACHMENT A

DATA TABLES

COD in Water

June 2002 Sample Collections - Marion Bragg Landfill

CET Report dated June 27, 2002

Marion Bragg Landfill - March 2002 - Chemical Oxygen Demand in Ground Water and Surface Water

Results are in mg/L

Collection Point ==>	MB-1	MB-1D	MB-2	MB-5	MB-6	MB-7	MB-8	MB-9
Sample ID =====>	GW08PB	GW08DPPB	GW07PB	GW03PB	GW04PB	GW05PB	GW06PB	GW02PB
Lab Sample No. ==>	197897	197898	197896	197892	197893	197894	197895	197891
Collection Date. ==>	6/13/02	6/13/02	6/13/02	6/13/02	6/13/02	6/13/02	6/13/02	6/13/02
RL								

COD	10	10 UJ	10 J	28 J	30 J	41 J	26 J	111	28 J
-----	----	-------	------	------	------	------	------	-----	------

Marion Bragg Landfill - March 2002 - Chemical Oxygen Demand in Ground Water and Surface Water

Results are in mg/L

Collection Point ==>	MB-10	Field Blank
Sample ID ==>>>>	GW01PB	GW09FBPB
Lab Sample No. ==>	197890	197899
Collection Date. ==>	6/13/02	6/13/02
RL		

COD 10 19 J 10 UJ

ATTACHMENT B

FINAL REPORTS OF ANALYSES

COD in Water

June 2002 Sample Collections - Marion Bragg Landfill

CET Report dated June 27, 2002

CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197897 SAMPLE ID- GW08PB *MB-1*
DATE SAMPLED- 06/13/02 *CAE 8/26/02*
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED SAMPLE MATRIX- GW
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND TIME SAMPLED- 1130
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	<i>10 UJ</i> 10 mg/L <i>CAE 8/26/02</i>	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR *A.L.N.*

CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197898 SAMPLE ID- GW08DPPB *MB-1D* SAMPLE MATRIX- GW
DATE SAMPLED- 06/13/02 *CAE8/20/02* TIME SAMPLED- 1130
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED RECEIVED BY- ALT
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	10 mg/L <i>J</i>	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR *A. L. H.*

CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197896 SAMPLE ID- GW07PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

MB-2

CAE8/26/02

SAMPLE MATRIX- GW
TIME SAMPLED- 1045
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	28 mg/L J	10

CAE8/28/02

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197892 SAMPLE ID- GW03PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

MB-5

CAES/20/02

SAMPLE MATRIX- GW
TIME SAMPLED- 0935
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	30 mg/L J	10


CAES/28/02

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197893 SAMPLE ID- GW04PB *MB-6* SAMPLE MATRIX- GW
DATE SAMPLED- 06/13/02 *cae s/n/or* TIME SAMPLED- 1000
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED RECEIVED BY- ALT
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	41 mg/L <i>J</i>	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR *A.L.H.*

CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197894 SAMPLE ID- GW05PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

MB-7

CAE 8/26/02

SAMPLE MATRIX- GW
TIME SAMPLED- 1020
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	26 mg/L J	10

CAE 8/28/02

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197895 SAMPLE ID- GW06PB *MB-8* *06/20/02* SAMPLE MATRIX- GW
DATE SAMPLED- 06/13/02 TIME SAMPLED- 0905
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED RECEIVED BY- ALT
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	111 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197891 SAMPLE ID- GW02PB *MB-9* SAMPLE MATRIX- GW
DATE SAMPLED- 06/13/02 *CAE 8/16/02* TIME SAMPLED- 0835
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED RECEIVED BY- ALT
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	28 mg/L <i>J</i>	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR *A.L.H.*

CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197890 SAMPLE ID- GW01PB *MB-10* SAMPLE MATRIX- GW
DATE SAMPLED- 06/13/02 *CAE 8/20/02* TIME SAMPLED- 0805
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED RECEIVED BY- ALT
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	19 mg/L <i>J</i>	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR *R.L.H.*

CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM
Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197899 SAMPLE ID- GW09FBPB *Field Blank* SAMPLE MATRIX- GW
DATE SAMPLED- 06/13/02 *CAE 8/26/02* TIME SAMPLED- 1035
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED RECEIVED BY- ALT
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	<i>10 UJ</i> 10 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR *A. L. H.*

ATTACHMENT C

TRILLIUM COMMUNICATION REQUESTING RAW DATA DOCUMENTATION

COD in Water

June 2002 Sample Collections - Marion Bragg Landfill

CET Report dated June 27, 2002

Carol Erikson

From: "Carol Erikson" <cerikson@trilliuminc.com>
To: "Rodney Raimonde" <rraimonde@compuchemlabs.com>
Sent: Tuesday, July 09, 2002 6:39 AM
Subject: Marion Bragg COD Data

Rodney -

Yesterday, I received a CET data package for COD analyses dated 6/27/02 and applicable to the latest set of samples from Marion Bragg.

The package contains only results forms and a chain of custody record - no supporting raw data are provided, although "Full Data Package" was requested on the chain of custody. Please request the missing information from CET (including raw data documentation of their referenced ICals) and forward to me ASAP.

Thanks!

Carol

Carol Erikson
Trillium, Inc.
cerikson@trilliuminc.com
865/966-8880
865/966-8885 fax

07/09/2002



DATA VALIDATION

FOR

**MARION BRAGG LANDFILL
MARION, INDIANA**

INORGANIC ANALYSIS DATA

**Total Suspended Solids,
Chloride, and Ammonia-Nitrogen in Water**

**Sample Delivery Group #RS1067
June 2002 Sample Collections**

Chemical Analyses Performed by:

**CompuChem Environmental
Cary, North Carolina**

FOR

**O & M, Inc.
Danville, Indiana**

BY

**Trillium, Inc.
356 Farragut Crossing Drive
Knoxville, TN 37922
(865) 966-8880**

August 29, 2002

EXECUTIVE SUMMARY

Validation of the wet chemistry analysis data (total suspended solids [TSS], ammonia-nitrogen [ammonia], and chloride) prepared by CompuChem Environmental for nine water samples and one field blank (FB) from the Marion Bragg Landfill Site in Marion, Indiana, has been completed by Trillium, Inc. The data were issued by the laboratory in a single data package under Sample Delivery Group (SDG) #RS1067, which was received for review on August 1, 2002, with additional information provided on August 27 and 28, 2002. The following field samples were reported:

GW08PB (MB-1)	GW08DPPB (MB-1D)	GW07PB (MB-2)
GW03PB (MB-5)	GW04PB (MB-6)	GW05PB (MB-7)
GW06PB (MB-8)	GW02PB (MB-9)	GW01PB (MB-10)
GW09FBPB (Field Blank)		

Based on the validation effort, the sample results were qualified or corrected as follows:

- Results for chloride in GW08PB, GW08DPPB, GW07PB, GW03PB, GW04PB, GW05PB, GW06PB, GW02PB, and GW01PB were qualified as less than the reported values and as estimated (UJ).
- The result for chloride in GW09FBPB was qualified as estimated (J).
- Results for TSS in GW08PB, GW08DPPB, GW07PB, GW03PB, GW04PB, GW05PB, GW06PB, GW02PB, and GW01PB were qualified as estimated (J).
- The positive results for ammonia in GW07PB, GW03PB, GW04PB, GW05PB, GW06PB, and GW02PB and for TSS in GW08PB were rounded to reflect two significant figures (instead of three as reported by the laboratory).
- The RLs for ammonia, chloride, and TSS were rounded to reflect two significant figures (instead of three as reported by the laboratory).

Brief explanations of the reasons for the actions taken above may be found in the Overall Assessment (Section X). Details of the validation findings and conclusions based on review of the results for each quality control requirement are provided in the remaining sections of this report.

Documentation issues are discussed in Section IX.

This validation report should be considered part of the data package for all future distributions of the wet chemistry data.

INTRODUCTION

Analyses for the requested parameters were performed by the laboratory according to the following analytical methods:

Ammonia - EPA 350.1
Chloride - EPA 300.1
Total Suspended Solids (TSS) - EPA 160.2

These methods are found in "Methods for Chemical Analysis of Water and Wastes," EPA 600/4-79/020, Rev. 3/83, and "Methods for the Determination of Organic and Inorganic Compounds in Drinking Water, Volume 1" (EPA 815/R-00/014).

Since no validation guidelines specific to the analytical methods used are available, the validation was based on the requirements of the referenced methods, the specifications of the project-specific Quality Assurance Project Plan (QAPP) and best professional judgment. The validation approach was similar to that described in USEPA's "National Functional Guidelines for Inorganic Data Review" (EPA-540/R-94/013, February 1994).

The data validation process is intended to evaluate data on a technical basis rather than a contract or method compliance basis. An initial assumption is that the data package contains sufficient raw data documentation to facilitate the validation process, comparable to the level of documentation required in a Contract Laboratory Program (CLP) data package.

During the validation process, laboratory data are verified against all available supporting documentation. Based on the findings of this review, qualifier codes may be added by the data validator. Validated results are, therefore, either qualified or unqualified. Unqualified results mean that the reported values may be used without reservation. Final validated results are annotated with the following codes in accordance with EPA's validation guidelines:

- U - The material was analyzed for, but was not detected above the level of the associated value. The associated value is either the sample quantitation limit or the sample detection limit.
- R - The data are unusable. (Note: Analyte may or may not be present.)
- J - The associated value is an estimated quantity.
- UJ - The material was analyzed for, but was not detected. The associated value is an estimate and may be inaccurate or imprecise.

These codes are recorded on the customized data tables (Attachment A) and the laboratory's Classical Chemistry Analyses Data Sheets (Form Is; Attachment B) to qualify the results as appropriate according to the review of the data packages.

Two facts should be noted by all data users. First, **the "R" qualifier means that the laboratory-reported value is unusable.** In other words, due to significant quality control problems, the analysis is invalid and provides no information as to whether the analyte is present or not. Rejected values should not appear on data tables because they cannot be relied upon, even as a last resort. Second, **no analyte concentration is guaranteed to be accurate even if all associated quality control is acceptable.** Strict quality control conformance serves only to increase confidence in reported results; any analytical result will always contain some error.

The data user is also cautioned that the validation effort is based on the raw data printouts as provided by the laboratory. Software manipulation cannot be routinely detected during validation; unless otherwise stated in the report, these kinds of issues are outside the scope of this review.

I. Holding Times, Preservation and Sample Integrity

The samples were collected on June 13, 2002. Analyses for all parameters were conducted within the holding times specified by the referenced methods and the QAPP (28 days from collection for chloride and ammonia; seven days from collection for TSS).

Preservation of the samples for ammonia (and chemical oxygen demand, COD) analysis with sulfuric acid and ice and the samples for TSS and chloride analyses with ice was documented by the sampler on both chain of custody (COC) records. Acceptable cooler temperatures (4°C) on receipt at the laboratory were documented on both COCs and on the laboratory's receiving log. Acceptable pHs (<2) for the ammonia containers were documented on the receiving log for all samples, but no receiving log pertaining to the sample containers for COD analysis was provided in the data package. (Note: A single container is routinely provided to the laboratory for both ammonia and COD analyses. The laboratory splits these samples to facilitate their subcontract of the COD analyses to Chemical and Environmental Technology, Inc. (CET); therefore, the two analyses are separately logged-in at CompuChem). Upon request, the laboratory provided the COD receiving log, which documented acceptable pHs for these samples on receipt at the laboratory, to Trillium via facsimile on 8/27/02. No further action was taken by the validator.

II. Calibrations

All samples were analyzed for chloride on 6/18/02. A calibration curve incorporating a blank and eight standards at concentrations ranging from 0.1 mg/L to 50 mg/L was documented for 6/5/02. The reported correlation coefficient for the best-fit linear regression describing the calibration data was acceptable (>0.995) and was verified by the validator. ICV/CCV standards were run at appropriate frequencies during the chloride analysis series and showed acceptable recoveries relative to the true values (102-107%; QC 85-115%).

The samples were analyzed for ammonia on 6/17/02; a calibration curve incorporating a blank and seven standards at concentrations ranging from 0.1 mg/L to 8 mg/L was documented for this date. The reported correlation coefficient for the best-fit linear regression describing the calibration data was acceptable (>0.995) and was verified by the validator. ICV/CCV standards were run at appropriate frequencies during the ammonia analysis series and showed acceptable recoveries relative to reported true values (96.5-105%; QC 85-115%). However, since only final results are displayed in the raw data documentation (i.e., absorbance values are not provided), these results cannot be verified by the validator.

Calibration is not applicable to the weight measurements used to determine TSS.

III. Blanks

No contamination was reported in any of the method blanks associated with the sample analyses; these results are supported by the raw data available in the data package.

A field blank (GW09FBPB) was submitted for analysis with this set of site samples. No TSS or ammonia was detected above the applicable reporting limit (RL) in the field blank. Chloride was reported at 6.9 mg/L in the field blank. Results for chloride in GW08PB, GW08DPPB, GW07PB, GW03PB, GW04PB, GW05PB, GW06PB, GW02PB, and GW01PB were qualified as less than the reported values (U) based on the associated field blank contamination. In each case, the sample result was less than five times the field blank concentration.

It is unusual for chloride to be detected at a concentration this high in a field blank. The reported site sample concentrations are very comparable to the concentrations reported in previous sampling rounds, and the field duplicate results match quite well (see Section VII), suggesting that these results may actually represent true sample components rather than artifacts of the sample collection and handling procedures. At the discretion of the data user, the source water used to prepare the field blank should be evaluated for the presence of chloride, especially if it is a source not previously utilized in support of this project. Further investigation of this issue is beyond the scope of this validation effort.

IV. Laboratory Control Samples (LCS)

Laboratory Control Samples prepared and analyzed with the samples for all three parameters showed acceptable recoveries, ranging from 96.7-107%.

V. Laboratory Duplicate Analysis

Laboratory duplicate analyses were performed for TSS using GW08PB. Reproducibility was very good for these paired samples, with a relative percent difference (RPD) of 13.3 percent ($QC \leq 25$ RPD).

VI. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD analyses were performed on sample GW08PB for ammonia and chloride. Recoveries for ammonia (95.5% and 93.3%) were acceptable (QAPP QC 80-120%) and showed excellent reproducibility, with an RPD of 2.4% (QAPP QC ≤ 20 RPD) based on measured concentrations.

Recoveries for chloride were unacceptably low in both spiked analyses (76.8% and 78.2%), although they showed excellent reproducibility (1.1 RPD). Results for chloride in all samples were qualified as estimated (J) on this basis.

VII. Field Duplicates

Samples GW08PB and GW08DPPB were identified as a field duplicate pair. Positive paired results showed very good reproducibility (QAPP QC \leq 25% RPD) for chloride (0.4 RPD). TSS results showed unacceptable reproducibility (30 RPD); results for TSS in all samples except GW09FBPB were qualified as estimated (J) on this basis.

Ammonia was not detected above the RL (0.10 U) in either sample analysis. Therefore, no quantitative evaluation of precision could be made for this parameter using these data.

VIII. Sample Results Verification

With the exception noted below, results reported for TSS were correctly calculated and accurately reported from the raw data for all samples.

The result for TSS in GW07PB was incorrectly reported by the laboratory as 48.2 mg/L, while the supporting raw data indicated a concentration of 96.4 mg/L. At the request of the validator, the laboratory rechecked their calculations and provided a corrected Form I for this sample, showing a concentration of 96.4 mg/L for TSS. No further action was necessary.

According to the analysis run log, all samples (including the field blank) were run at 5-fold dilutions for chloride. All reported sample results appropriately reflected this dilution factor. However, the highest final concentration reported was 30.6 mg/L, which is well within the established calibration range (0.1 mg/L to 50 mg/L). At the request of the validator, the laboratory explained that their most recently established method detection limits (MDLs) were very low, allowing them to dilute all samples 5-fold (thus avoiding potential interferences due to high chloride concentrations and prolonging column life) and still maintain an RL of 2.0 mg/L (see Attachment C). Although dilutions should generally be avoided unless they are necessary to achieve target analyte responses within the calibration range, the chloride responses in all of the 5-fold diluted sample analyses were within the established calibration range and almost all were greater than the specified RL of 2.0 mg/L. Therefore, there is no obvious technical problem with this approach, and no action was taken on this basis.

Sample results for ammonia were correctly transcribed from the raw data; since only direct readings of the final results were documented, no verification of the reported concentrations could be made by the validator.

Sample results were consistently reported to three significant figures. This is not in accordance with past CompuChem policy, which was defined as follows: *up to three significant figures are reported for positive sample results PROVIDED that no more decimal places than are found in the applicable RL (which is established to a certain number of significant figures and decimal places based on statistical evaluations performed when it is established) are reported*, or current CompuChem policy, which simply states that values greater than 10 are reported to three significant figures and values less than 10 are reported to two significant figures. For consistency with historical data generated in support of this project, all results greater than or equal to 10 mg/L were adjusted to reflect three significant figures and values less than 10 mg/L (including RLs) were adjusted to reflect two significant figures. Specifically, the following actions were taken:

- The positive results for ammonia in GW07PB, GW03PB, GW04PB, GW05PB, GW06PB, and GW02PB and for TSS in GW08PB were rounded to reflect two significant figures because each value is less than 10 mg/L and was reported to three significant figures by the laboratory.
- The RLs for TSS, ammonia, and chloride were rounded to reflect two significant figures (instead of three as reported by the laboratory).

The data tables in Attachment A list all individual sample analyte results, whether or not the value or qualifier was changed as a result of the validation effort.

IX. Documentation

Two chain of custody (COC) records were present in the data package and included all reported samples. The following issues were noted:

- Improper corrections were observed. To preserve the integrity of these documents, all necessary corrections must be made by drawing a single line through the incorrect entry, inserting the correct information, and initialing and dating the change. Obliterations, unsigned cross-outs, and "write-overs" are not legally defensible
- Copies of courier airbills were not included in the data package to document the shipment portion of the sample transfers. Airbill numbers, however, were documented on both COC records.
- Although this approach is specified by the Quality Assurance Project Plan (QAPP), additional sample volumes provided to facilitate the laboratory's analysis of an MS/MSD pair should not be recorded on the COC as separate samples. Instead, a notation should be made indicating the sample for which extra volume has been provided, with the instruction that this sample be used for the MS/MSD analysis.

MS/MSD analyses are laboratory-initiated quality control; if not for the logistical need to provide sufficient volume for the multiple analyses involved, MS/MSD pairs would never be mentioned on COC documentation. Note that this situation (i.e., the need to provide extra sample containers for QC analyses) is unique to water samples.

True values for chloride in the ion chromatography ICV and CCV standards were not documented in the data package. At the request of the validator, these values were provided via facsimile on 8/28/02 (ICV - 40 mg/L; CCV - 25 mg/L) by the laboratory (see Attachment C).

A revised Form I for GW07PB, showing the corrected TSS concentration (see Section VIII) was provided by the laboratory via facsimile on 8/28/02. This document was page-numbered by the validator and inserted into the data package as page 8, replacing the originally provided page. In addition, the final result for GW07PB on the TSS worksheet (page 76 of the data package) was corrected by the validator to 96.4 mg/L (from 48.2 mg/L).

For ammonia, absorbance readings are provided for the initial calibration standards but only direct readings of the final results were documented in the raw data for all runs performed during the sample analysis series. Therefore, no verification of the concentrations reported for these analyses could be made by the validator. At the discretion of the data user, the laboratory may be requested to provide this documentation in future data packages prepared in support of this project.

A receiving log for COD was provided by the laboratory via facsimile on 8/27/02. This document was page-numbered by the validator and inserted into the data package by the validator as page 80a.

Most of these documentation issues do not directly affect the technical validity of the data generated for these samples, however some of them could be problematic if the data were to be used in litigation.

X. Overall Assessment

Sample results for the three wet chemistry parameters were qualified or corrected as follows based on the validation effort:

- Results for chloride in GW08PB, GW08DPPB, GW07PB, GW03PB, GW04PB, GW05PB, GW06PB, GW02PB, and GW01PB were qualified as less than the reported values based on associated field blank contamination and as estimated based on unacceptably low matrix spike recoveries for this parameter (UJ).
- The result for chloride in GW09FBPB was qualified as estimated (J) based on unacceptably low matrix spike recoveries for this parameter.

- Results for TSS in GW08PB, GW01DPPB, GW07PB, GW03PB, GW04PB, GW05PB, GW06PB, GW02PB, and GW01PB were qualified as estimated (J) based on poor reproducibility in the field duplicate analyses.
- The positive results for ammonia in GW07PB, GW03PB, GW04PB, GW05PB, GW06PB, and GW02PB and for TSS in GW08PB were rounded to reflect two significant figures because each value is less than 10 mg/L and was reported to three significant figures by the laboratory.
- The RLs for ammonia, chloride, and TSS were rounded to reflect two significant figures (instead of three as reported by the laboratory).

Documentation issues are discussed in Section IX.

This validation report should be considered part of the data package for all future distributions of the wet chemistry data.

ATTACHMENT A

DATA TABLES

**Wet Chemistry -SDG #RS1067
June 2002 Sample Collections - Marion Bragg Landfill**

Marion Bragg Landfill - December 2001 - Wet Chemistry Parameters in Ground Water

Results are in mg/L

Collection Point ==>	MB-1	MB-1D	MB-2	MB-5	MB-6	MB-7	MB-8
Sample ID ==>	GW08PB	GW08DPPB	GW07PB	GW03PB	GW04PB	GW05PB	GW06PB
Lab Sample No. ==>	RS1067-8	RS1067-9	RS1067-7	RS1067-3	RS1067-4	RS1067-5	RS1067-6
Collection Date. ==>	6/13/02	6/13/02	6/13/02	6/13/02	6/13/02	6/13/02	6/13/02
RL							

Ammonia	0.10	0.10 U	0.10 U	6.9	0.55	4.7	6.1	7.0
Chloride	2.0	23.8 UJ	23.9 UJ	11.4 UJ	21.5 UJ	14.8 UJ	26.7 UJ	30.6 UJ
Total Suspended Solids	1.0	9.6 J	13.0 J	96.4 J	30.0 J	288 J	260 J	951 J

Marion Bragg Landfill - December 2001 - Wet Chemistry Parameters in Ground Water

Results are in mg/L

Collection Point ==>	MB-9	MB-10	Field Blank
Sample ID ==>	GW02PB	GW01PB	GW09FBPB
Lab Sample No. ==>	RS1067-2	RS1067-1	RS1067-10
Collection Date. ==>	6/13/02	6/13/02	6/13/02
RL			

Ammonia	0.10	0.46	0.10 U	0.10 U
Chloride	2.0	12.7 UJ	22.7 UJ	6.9 J
Total Suspended Solids	1.0	110 J	107 J	1.0 U

ATTACHMENT B

CLASSICAL CHEMISTRY ANALYSES DATA SHEETS (Form Is)

Wet Chemistry -SDG #RS1067

June 2002 Sample Collections - Marion Bragg Landfill

SW-846

I-CC

CLASSICAL CHEMISTRY ANALYSES DATA SHEET

EPA SAMPLE NO.

GW08PB

MB-1

Lab Name: CompuChem

Contract: _____

Lab Code: LIBRTY

Case No.: _____

NRAS No.: _____

SDG No.: RS1067Matrix (soil/water): WATERLab Sample ID: RS1067-8Date Received: 6/14/02% Solids: 0.00Concentration Units (mg/L or mg/kg dry weight): mg/L

PARAMETER	CONCENTRATION	C	Q	M	DATE ANALYZED
TSS	9.6 9.60	J			6/18/02
Chloride	23.8	UJ			6/18/02
Ammonia	0.10 0.100	U			6/17/02

C. Erikson 8/29/02

Comments: _____

10

SW-846

1-CC

CLASSICAL CHEMISTRY ANALYSES DATA SHEET

EPA SAMPLE NO.

GW08DPFB

MB-1D

Lab Name: CompuChem

Contract: _____

Lab Code: LIBRTY

Case No.: _____

NRAS No.: _____

02/29/02

SDG No.: RS1067Matrix (soil/water): WATERLab Sample ID: RS1067-9Date Received: 6/14/02% Solids: 0.00Concentration Units (mg/L or mg/kg dry weight): mg/L

PARAMETER	CONCENTRATION	C	Q	M	DATE ANALYZED
TSS	13.0	J			6/18/02
Chloride	23.9	UJ			6/18/02
Ammonia	0.10 0.100	U			6/17/02

02/29/02

Comments: _____

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SW-846

1-CC

CLASSICAL CHEMISTRY ANALYSES DATA SHEET

EPA SAMPLE NO.

GW07PB

MB-2

Lab Name: CompuChem

Contract: _____

Lab Code: LIBRTY

Case No.: _____

NRAS No.: _____

CAE 8/21/02

SDG No.: RS1067Matrix (soil/water): WATERLab Sample ID: RS1067-7Date Received: 6/14/02% Solids: 0.00Concentration Units (mg/L or mg/kg dry weight): mg/L

PARAMETER	CONCENTRATION	C	Q	M	DATE ANALYZED
Chloride	11.4	UJ			6/18/02
TSS	96.4	J			6/18/02
Ammonia	6.9	5.94			6/17/02

CAE 8/21/02

Comments: _____

8
CAE 8/28/02

SW-846

1-CC

CLASSICAL CHEMISTRY ANALYSES DATA SHEET

EPA SAMPLE NO.

GW03PB

MB-5

Lab Name: CompuChem

Contract: _____

Lab Code: LIBRTY

Case No.: _____

NRAS No.: _____

CAE 8/24/02

SDG No.: RS1067Matrix (soil/water): WATERLab Sample ID: RS1067-3Date Received: 6/14/02% Solids: 0.00Concentration Units (mg/L or mg/kg dry weight): mg/L

PARAMETER	CONCENTRATION	C	Q	M	DATE ANALYZED
Chloride	21.5	UJ			6/18/02
TSS	30.0	J			6/18/02
Ammonia	0.55 0.548				6/17/02

CAE 8/24/02

Comments: _____

SW-846

1-CC

CLASSICAL CHEMISTRY ANALYSES DATA SHEET

EPA SAMPLE NO.

GW04PB

MB-6

Lab Name: CompuChem

Contract: _____

Lab Code: LIBRTY

Case No.: _____

NRAS No.: _____

CAE 8/29/02

SDG No.: RS1067Matrix (soil/water): WATERLab Sample ID: RS1067-4Date Received: 6/14/02% Solids: 0.00Concentration Units (mg/L or mg/kg dry weight): mg/L

PARAMETER	CONCENTRATION	C	Q	M	DATE ANALYZED
Chloride	14.8	UJ			6/18/02
TSS	288	J			6/18/02
Ammonia	4.7 +.68				6/17/02

CAE 8/29/02

Comments: _____

5

SW-846

1-CC

CLASSICAL CHEMISTRY ANALYSES DATA SHEET

EPA SAMPLE NO.

GW05PB

MB-7

Lab Name: CompuChem

Contract: _____

Lab Code: LIBRTY

Case No.: _____

NRAS No.: _____

SDG No.: RS1067Matrix (soil/water): WATERLab Sample ID: RS1067-5Date Received: 6/14/02% Solids: 0.00Concentration Units (mg/L or mg/kg dry weight): mg/L

PARAMETER	CONCENTRATION	C	Q	M	DATE ANALYZED
Chloride	26.7	UJ			6/18/02
TSS	260	J			6/18/02
Ammonia	6.1	6.12			6/17/02

CAE 8/29/02

Comments: _____

6

SW-846

1-CC

CLASSICAL CHEMISTRY ANALYSES DATA SHEET

EPA SAMPLE NO.

GW06PB

MB-8

Lab Name: CompuChem

Contract: _____

Lab Code: LIBRTY

Case No.: _____

NRAS No.: _____

CAC 8/24/02

SDG No.: RS1067Matrix (soil/water): WATERLab Sample ID: RS1067-6Date Received: 6/14/02% Solids: 0.00Concentration Units (mg/L or mg/kg dry weight): mg/L

PARAMETER	CONCENTRATION	C	Q	M	DATE ANALYZED
Chloride	30.6	UJ			6/18/02
TSS	951	J			6/18/02
Ammonia	7.0 - 6.96				6/17/02

CAC 8/24/02

Comments: _____

SW-846

I-CC

CLASSICAL CHEMISTRY ANALYSES DATA SHEET

EPA SAMPLE NO.

GW02PB

MB-9

Lab Name: CompuChem

Contract: _____

Lab Code: LIBRTY

Case No.: _____

NRAS No.: _____

CAE 8/29/02

SDG No.: RS1067Matrix (soil/water): WATERLab Sample ID: RS1067-2Date Received: 6/14/02% Solids: 0.00Concentration Units (mg/L or mg/kg dry weight): mg/L

PARAMETER	CONCENTRATION	C	Q	M	DATE ANALYZED
Chloride	12.7	UT			6/18/02
TSS	110	J			6/18/02
Ammonia	0.46 0.463				6/17/02

CAE 8/29/02

Comments: _____

3

SW-846

I-CC

CLASSICAL CHEMISTRY ANALYSES DATA SHEET

EPA SAMPLE NO.

GW01PB

MB-10

Lab Name: CompuChem

Contract: _____

Lab Code: LIBRTY

Case No.: _____

NRAS No.: _____

SDG No.: RS1067Matrix (soil/water): WATERLab Sample ID: RS1067-1Date Received: 6/14/02% Solids: 0.00Concentration Units (mg/L or mg/kg dry weight): mg/L

PARAMETER	CONCENTRATION	C	Q	M	DATE ANALYZED
Chloride	22.7	UJ			6/18/02
TSS	107	J			6/18/02
Ammonia	0.10 0.100	U			6/17/02

CAE 8/29/02

Comments: _____

2

SW-846

1-CC

CLASSICAL CHEMISTRY ANALYSES DATA SHEET

EPA SAMPLE NO.

GW09FBPB

Field Blank

Lab Name: CompuChem

Contract: _____

Lab Code: LIBRTY

Case No.: _____

NRAS No.: _____

06/29/02

SDG No.: RS1067Matrix (soil/water): WATERLab Sample ID: RS1067-10Date Received: 6/14/02% Solids: 0.00Concentration Units (mg/L or mg/kg dry weight): mg/L

PARAMETER	CONCENTRATION	C	Q	M	DATE ANALYZED
TSS	1.0 1.00	U			6/18/02
Chloride	6.9 6.86	J			6/18/02
Ammonia	0.10 0.100	U			6/17/02

06/29/02

Comments: _____

II

ATTACHMENT C

LABORATORY RESPONSES TO VALIDATOR INQUIRIES

Wet Chemistry -SDG #RS1067

June 2002 Sample Collections - Marion Bragg Landfill

August 28, 2002

In response to the inquiry for SDG RS1067:

The true values for the chloride analysis are as follows: ICV TV = 40.0 mg/L,
CCV TV = 25.0 mg/L.

The TSS results were reviewed and there was one result found to have been reported incorrectly. That sample was RS1067-7 (client ID GW07PB). The corrected form has been attached.

It is correct that all samples on the IC that were analyzed for chloride were diluted by a factor of five. The MDLs were recently reanalyzed, and when calculated, were at a low enough level to allow the dilution of samples by a factor of five and still maintain the same reporting limit of 2.0 mg/L. This has been initiated to help eliminate interference and to prolong the column life.

CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

Environmental Analytical Services

RECEIVED
4/27/02
Trillium, Inc.

Diane Byrd
Compuchem
501 Madison Ave.
Cary, NC 27513

A. Link Thrower
Chemical and Environmental Technology
(CET)
P.O. Box 12298
Research Triangle Park, NC
27709
Phone- (919) 467-3090 Fax - (919) 467-
3515

June 27, 2002

Dear Diane:

Enclosed is the report for 10 water samples submitted to Chemical and Environmental Technology on June 14, 2002 for COD analysis. The samples were collected on June 13, 2002 and were analyzed within the required holding time.

All quality control parameters were within limits.

Sincerely,



A. Link Thrower
Laboratory Director - CET

CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197890 SAMPLE ID- GW01PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

SAMPLE MATRIX- GW
TIME SAMPLED- 0805
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

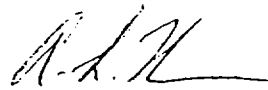
ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	19 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197891 SAMPLE ID- GW02PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

SAMPLE MATRIX- GW
TIME SAMPLED- 0835
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

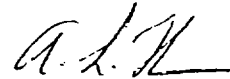
ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	28 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197892 SAMPLE ID- GW03PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

SAMPLE MATRIX- GW
TIME SAMPLED- 0935
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

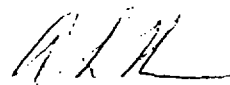
ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	30 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197893 SAMPLE ID- GW04PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

SAMPLE MATRIX- GW
TIME SAMPLED- 1000
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	41 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197894 SAMPLE ID- GW05PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

SAMPLE MATRIX- GW
TIME SAMPLED- 1020
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

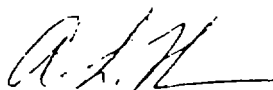
ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	26 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM
Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197895 SAMPLE ID- GW06PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

SAMPLE MATRIX- GW
TIME SAMPLED- 0905
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

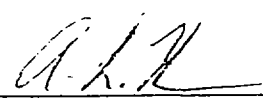
ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	111 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197896 SAMPLE ID- GW07PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

SAMPLE MATRIX- GW
TIME SAMPLED- 1045
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

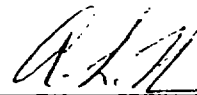
ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	28 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIAWE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197897 SAMPLE ID- GW08PB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

SAMPLE MATRIX- GW
TIME SAMPLED- 1130
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

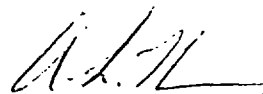
ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	<10 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197898 SAMPLE ID- GW08DPPB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

SAMPLE MATRIX- GW
TIME SAMPLED- 1130
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

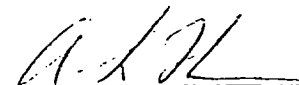
ANALYSIS	METHOD	ANALYSIS		RESULT UNITS	PQL
		DATE	BY		
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	10 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

FINAL REPORT OF ANALYSES

COMPUCHEM

Attn: DIANE BYRD
501 MADISON AVENUE
CARY, NC 27513-

REPORT DATE: 06/27/02

SAMPLE NUMBER- 197899 SAMPLE ID- GW09FBPB
DATE SAMPLED- 06/13/02
DATE RECEIVED- 06/14/02 SAMPLER- NOT SPECIFIED
TIME RECEIVED- 1430 DELIVERED BY- CHRIS BRAND

SAMPLE MATRIX- GW
TIME SAMPLED- 1035
RECEIVED BY- ALT

Page 1 of 1

PROJECT NAME : MARION BRAGG

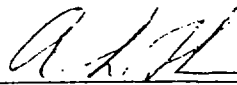
ANALYSIS	METHOD	ANALYSIS DATE	BY	RESULT UNITS	PQL
CHEMICAL OXYGEN DEMAND	EPA 410.4	06/17/02	JMB	<10 mg/L	10

PQL = Practical Quantitation Limit

Results followed by the letter J are estimated concentrations.

NC DENR CERTIFICATIONS: DWQ - 96; PUBLIC WATER SUPPLY - 37724

LABORATORY DIRECTOR



COMPUCHEM

a division of Liberty Analytical Corp.

501 Madison Avenue
Cary, NC 27513
1-800-833-5097

SUBCONTRACT CHAIN-OF-CUSTODY RECORD

Project Name: <u>MARION BRASS</u>	Samples shipped to: <u>CET</u>	CompuChem point-of-contact: (4) <u>Diane Boyd</u>
TAT: <u>13</u>	Contact:	Phone: (919) 379-4100 X <u>4009</u>
Report style: <u>Full data Package</u>	Address:	Fax: (919) 379- <u>4050</u>
Disc requirement:	Phone: ()	Sampling complete? Y or N (see Note 1)
	Project Locale (state)	Project-specific (PS) or Batch (B) QC?

BOX #1	1. Surface Water 2. Ground Water 3. Leachate 4. Rinsate 5. Soil / Sediment / Sludge	6. Trip Blank 7. Oil 8. Waste 9. Other	BOX #2	A. HCl + Ice B. HNO ₃ + Ice C. NaOH + Ice D. H ₂ SO ₄ + Ice E. Unpreserved	F. Ice Only G. Other H. NaHSO ₄ + Ice I. ZnAc+NaOH + Ice J. Methanol	BOX #3	F- Filtered U- Unfiltered	BOX #4	H- High M- Medium L- Low	BOX #5	C- CLP S- SW-846 W- CWA 600-series O- Other
--------	---	---	--------	---	---	--------	------------------------------	--------	--------------------------------	--------	--

Sample ID	Date / Year	Time	Box #1	Box #2	Box #3	Box #4	Box #5	PARAMETERS	CCN	Remarks / Comments (see Notes 2 & 3)
GW01PB	6/13	08:05	WA					1	✓	RT1007-1
GW02PB	✓	08:35	✓					1	✓	91
GW03PB	✓	09:35	✓					1	✓	92
GW04PB	✓	10:00	✓					1	✓	93
GW05PB	✓	10:20	✓					1	✓	94
GW06PB	✓	09:25	✓					1	✓	95
GW07PB	✓	10:45	✓					1	✓	96
GW08PB	✓	11:30	✓					3 *	✓	97
GW08DPB	✓	11:30	✓					1	✓	98
GW09PB	✓	10:35	✓					1	✓	99

Clients Special Instructions: _____ Temperature 2.5 °C

Lab: Received in good condition? Y or N Describe any problems: _____

#1 Relinquished by: (sig) <u>[Signature]</u> Date: <u>6/14/03</u>	#2 Relinquished by: (sig) <u>[Signature]</u> Date: <u>6/14</u>	Relinquished by: (sig) _____ Date: _____
Company Name: <u>CompuChem</u> Time: <u>2:15</u>	Company Name: <u>CET</u> Time: <u>2:30</u>	Company Name: _____ Time: _____
#1 Received by: (sig) <u>[Signature]</u> Date: <u>6/14/03</u>	#2 Received by: (sig) <u>[Signature]</u> Date: <u>6/14/03</u>	#2 Received by: (sig) _____ Date: _____
Company Name: <u>CET</u> Time: <u>2:15</u>	Company Name: <u>CET</u> Time: <u>14:10</u>	Company Name: _____ Time: _____

Note (1) If "N" lab should batch samples to await remainder of project - maximizing batch size and minimizing QC ratio, if "Y" lab should begin processing batches now

Note (2) Samples should be stored 60 days after date report mailed at no extra charge.

Note (3) All lab copies of data should be retained for a minimum of 3 years

Note (4) Please call point-of-contact to verify receipt of samples

COD

WATER/WASTEWATER METHOD EPA 410.4

CET INORGANIC ANALYSIS FORM

LIMS BATCH #-SAMPLE TYPE

DATE: 4/11/02

268324-WW

TIME: 1004

268325-GW

ANALYST: jmb

REFERENCE CURVE DATE: 4/04/02

DIGESTION TIME: 1127 TO 1327

Batch #	Sample #	Dilution	Volume (mL)	Absorbance @ 600 nm	Result (mg/L)	% Recovery/ RAPD	CurveRange (Low/High)
	Blk	—	2	0.000			LOW
	OK 512 75 ^{mg} L			0.034	71/75	95 %	
268325	197890 ✓			0.010	19		
	197891 ✓			0.014	28		
	197892 ✓			0.015	30		
	197893 ✓			0.020	41		
	197894 ✓			0.013	26		
	197895 ✓			0.052	111		
	197896 ✓			0.014	28		
	197897 ✓			0.002	<10		
	197898 ✓			0.006	10		
	197899 ✓			0.000	<10		
	Blk			0.000			HIGH
	OK 512 150 ^{mg} L	✓	✓	0.075	151/150	101 %	

WATER/WASTEWATER METHOD EPA 410.4

LIMS BATCH #-SAMPLE TYPE

DATE: 6/17/02

268324-ww

TIME: 1004

ANALYST: jmb

REFERENCE CURVE DATE: 6/64/02

DIGESTION TIME: 1127 TO 1307

[illegible]

CHEMICAL & ENVIRONMENTAL TECHNOLOGY, INC.

ENVIRONMENTAL ANALYTICAL SERVICES

REFERENCES

Wastewater Program References (Includes Groundwater and Solids)

"Rules Governing Laboratory Certification" NCAC, Title 15 DENR, Chapter 2H .0800, February 2, 1994
North Carolina Administrative Code for Wastewater Laboratories

Federal Register, 40 CFR Part 136, July 1, 1998

Metals, Inorganics, and Organics for groundwater and wastewater sampling, preservation, and analysis

Groundwater Section Guidelines for the Investigation and Remediation of Soils and Groundwater, Volumes I and II, May and January 1998, Respectively

Required Methodology for Groundwater and Soil Remediation and Assessment
(UST and Non-UST).

Method for the Determination of Volatile Petroleum Hydrocarbons (VPH), MADEP, January 1998

VPH Method

Method for the Determination of Extractable Petroleum Hydrocarbons (EPH), MADEP, January 1998

EPH Method

Guidelines for Site Assessment, cleanup, and UST Closure, State of California Leaking UST Task Force, Appendix D, October 1989

VPH Method for TPH GRO and DRO

SW - 846, Third Edition, Final Update III, June 1997

Organics and Organics in soil or sludges. Hazardous Waste. TCLP for Solid and Liquid Waste. Metals in soil, sludge, or groundwater.
(Metals analyses for NC groundwater compliance are digested by Method 3030C, Standard Methods, 18th Edition.)

Drinking Water Program References

"Laboratory Certification" NCAC, Title 15A DHHS, 20D.0200, January 26, 1996

North Carolina Administrative Code for Drinking Water Laboratories

"Rules Governing Public Water Systems" DENR, Division of Environmental Health, Public Water Supply Section, October, 1997

Sampling

North Carolina Administrative Code for required Methods and Sampling for Public Water Systems

Federal Register, 40 CFR Parts 141-143, July 1, 1998

Metals, Inorganics, and Organics for drinking water sampling, preservation, and analysis

"Technical Notes on Drinking Water Methods" USEPA, EMSL, EPA-600/R-94-173, October 1994 (NTIS PB95-104766)

General guidance and notes regarding updates for acceptable methods and practices

"Methods for the Determination of Metals in Environmental Samples-Supplement I"

USEPA ORD, EPA-600/R-94/111, May 1994 (NTIS PB95-125472)

"Methods for the Determination of Organic Compounds in Drinking Water", USEPA, EPA-600/4-88-039, December, 1980, Revised July 1991

References Supporting Wastewater and Drinking Water Programs

"Methods for Chemical Analysis of Water and Wastes", USEPA

EPA-600/4-79-020, March 1983

Organics and wet chemistry analyses for wastewater, groundwater, and drinking water

"Standard Methods", 18th Edition, 1992

Organics, Metals, Organics, Total & Fecal Coliform (and Strep) for groundwater, wastewater, stream samples, and drinking water

"Method 504.1 1,2-Dibromoethane (EDB), 1,2 Dibromo-3-Chloropropane (DBCP), and 1,2,3-trichloropropane (123 TCP) in water by microextraction and GC, Rev 1.1 USEPA, ORD 1995

Wastewater and Drinking Water